PRELIMINARY

INSTRUCTION MANUAL

REGULATED POWER SUPPLIES

LAMBDA

LAMBDA ELECTRONICS CORP.–MELVILLE, L. I., N. Y.

PRELIMINARY

INSTRUCTION MANUAL

FOR

REGULATED POWER SUPPLIES

MODELS LK-340 —LK-345

BEARING SERIAL NO.

PREFIX A

36V 9A DB

This manual provides instructions intended for the operation of Lambda power supplies, and is not to be reproduced without the written consent of Lambda Electronics Corp. All information contained herein applies to all metered and non-metered LK half-rack models unless otherwise specified.

LAMBDA ELECTRONICS CORP. MELVILLE, L. I., N. Y.
MAIN PLANT TELEPHONE: 516 MYrtle 4-4200

Temperature Coefficient...Change in output voltage less than 0.015%/°C

DC OUTPUT--Current regulated for line and load; Automatic crossover with voltage limit

Multi-Current Ranges.....Current range must be chosen to suit the appropriate maximum ambient temperature. Current ratings apply for entire voltage range. For maximum current range see Table II. Minimum current 5% of 40° rating in Table II.

Voltage Range.....For voltage range see Table I; voltage ratings apply for entire current range.

REGULATED CURRENT OUTPUT; AUTOMATIC CROSSOVER

Regulation (line).....0.1% or 10 milliamperes, whichever is greater, for input variations from 105-132 or 132-105 volts AC

Regulation (load).....0.1% or 10 milliamperes, whichever is greater, for load voltage changes from 0 to rated VDC or rated VDC to 0 volts.

AC INPUT--105-132 volts AC at 57-63 Hz;

OVERLOAD PROTECTION

Thermal.....Thermostat, resets automatically when over-temperature condition is eliminated

Electrical

External Overload Protection...Adjustable, automatic, electronic current-limiting circuit, settable to 105 percent of rated current; limits output current to preset limit for protection of load and power supply when external overloads and short circuits occur

Internal.....

"SLO-BLO" fuse F1 protects the AC input circuit. Overload of the supply does not cause fuse failure.

"SLO-BLO" fuse F2 protects the load from excessive output current that can be caused by internal circuit failure.

Standard 19" rack.....LK half-rack units; used with rack adapters:
LRA-1 (slide accomodation provided)
LRA-2 (conventional mount) See figure 11.

MODEL OPTIONS

Suffix "OV" Overvoltage Protection Option...All LK power supplies are available with a built-in overvoltage protection circuit which prevents damage to the load that can be caused by excessive power supply output voltage.

Suffix "R" Fungus Proofing Option...Standard LK power supplies can be obtained with fungus proofing treatment with MIL V 173 varnish for all fungi nutrient components

Suffix "FM" Meter Option..Standard LK power supplies can be obtained with voltmeter and ammeter

OPERATING INSTRUCTIONS

CONTROLS, INSTRUMENTS AND FUSES

ON-OFF Switch. The ON-OFF switch, located on the front panel, controls application of input power to the supply. When the switch is in the ON position, the red indicator glows.

OUTPUT VOLTAGE Control. The OUTPUT VOLTAGE control is a dual control consisting of a coarse adjustment potentiometer, which varies the DC voltage over a range 0-19, 0-35 or 0-59 volts, as applicable, and a fine adjustment potentiometer, which varies the DC voltage over a one-volt range. Clockwise rotation results in increasing voltage. The total DC voltage output for voltage regulated operation, is equal to the sum of each shaft setting; for current regulated operation the maximum voltage limit is equal to the sum of each shaft setting. The control is located on the front panel of all units.

CURRENT LIMITER Control. The CURRENT LIMITER control is a dual control consisting of a coarse adjustment potentiometer, which varies the DC current over 90% of the rated current range and a fine adjustment potentiometer, which varies the DC current over 10% of the rated current range. Clockwise rotation results in increasing current. The total DC current output for current regulated operation is equal to the sum of each shaft setting; for voltage regulated operation the maximum current limit is equal to the sum of each shaft setting. The control is located on the fromt panel of all units.

Output Voltage Meter. A DC voltmeter monitors the voltage at the output terminals of metered (FM) units for the rated voltage range.

Output Current Meter. A DC ammeter monitors the load output current of metered (FM) units for the rated current range.

Fuses Fuse F1, internally located, is a 3AG "SLO-BLO" fuse which functions in the AC input circuit.

Fuse F2, internally located, is a 3AG "SLO-BLO" fuse which protects the load from excessive output current that can be caused by internal circuit failure.

NOTE: For fuse values see fuse chart in SPECIFICATIONS AND FEATURES

Connection Terminals. Make all connections to the supply at the terminal block on the rear of the supply. Apply input power through the line cord or directly to terminals 1 and 2 if the line cord is removed. Always connect the ungrounded (hot) power lead to terminal 1.

The supply positive terminal is brought out to terminal 6. The supply negative terminal is brought out to terminal 4. Recommended wiring of the power supply to the load and selection of wiring is shown in figures 1 through 8. Selection of proper wiring is made on the basis of load requirements. Make all performance checks and measurements of current or voltage at the rear output terminals. Connect measuring devices directly to terminals or use the shortest leads possible.

OV ADJ Control. This potentiometer is only used on units with the OV Overvoltage Protector option. The OV ADJ control permits screwdriver setting of the overvoltage protection point through an access hole in the front panel.

GROUND CONNECTIONS

The Lambda power supply can be operated either with negative or positive output terminal grounded or with no terminal grounded. Both positive and negative ground connections are shown in the diagrams for all suggested output connections illustrated in this manual.

NOTE: When operating the supply with neither terminal grounded, high impedance leakage resistance and capacitance paths can exist between the power supply circuitry and chassis ground.

BASIC MODES OF OPERATION

This power supply is designed to operate as a constant voltage source or as a constant current source. Automatic crossover to either mode of operation occurs when load conditions change as follows:

Constant Voltage. The power supply will function as a constant voltage

source while the load current does not equal the current value, I_{LIM}, set by the CURRENT LIMITER control. When load current $I_L = \frac{V}{R_L} = I_{LIM}$, the supply will cross over automatically and will operate as a constant current source. Further decrease in value of load resistance R_L results in decrease of voltage across the load while current remains regulated to I_{LIM}.

Constant Current (Automatic Crossover). The power supply will function as a constant current source while the load voltage V_L does not equal the voltage value set by the OUTPUT VOLTAGE control. When load voltage V_L equals the value set by the OUTPUT VOLTAGE control, the supply will automatically cross over and operate as a constant voltage source.

SUPPLY-LOAD CONNECTIONS

NOTE: Refer to DETAILED OPERATING PROCEDURES for step-by-step instructions for operation of power supply.

CONNECTIONS FOR OPERATION AS A CONSTANT VOLTAGE SOURCE

The regulation of the power supply at the load may change when using the supply as a constant voltage source and connecting leads of practical length are used. To minimize the effect of the output leads on this characteristic, remote sensing is used. Recommended types of supply-load connections with local or remote sensing are described in the following paragraphs.

Refer to figure 1, to determine voltage drop for particular cable length, wire size and current conditions. Lead lengths must be measured from supply terminals to load terminals as shown in figure 2.

Two-Wire Connection, Figure 3. The two-wire connection with remote sensing, provides complete compensation for the DC voltage drops in the connecting cables. Compensation for lead drop is also valid for gradual changes of load current.

Four-Wire Connection, Figure 4. The four-wire connection with remote sensing, provides complete compensation for the DC voltage drops in the connecting cables. Compensation for lead drop is also valid for gradual changes of load current.

Programmed Voltage Connections, Using External Resistor, Figure 5. Discrete voltage steps can be programmed with a resistance voltage divider valued at 200 ohms/volt output and a shorting-type switch as shown in figure 5. When continuous voltage variations are required, use a variable resistor with the same 200 ohms/volt ratio in place of the resistive voltage divider and shorting-type switch. Use a low temperature coefficient resistor to assure most stable operation.

As shown in figure 5, voltages can be programmed utilizing either local or remote sensing connections, as desired.

Programmed Voltage Connections Using Programming Voltage, Figure 6. The power supply output voltage can be programmed with an externally connected programming power supply. The output voltage of the programmed supply will maintain a one-to-one ratio with the voltage of the programming supply.

The programming supply must have a reverse current capability of 6 ma. minimum.

Alternatively, when supplies with less than 6 ma. reverse current capability are used, a resistor capable of drawing 6 ma. at the minimum programming voltage must be connected across the output terminals of the supply. This programming supply must be rated to handle all excess resistor current at the maximum programming voltage.

CONNECTIONS FOR OPERATION AS A CONSTANT CURRENT SOURCE

Automatic Crossover Constant Current Connections, Figure 3. Figure 3 shows the connections which are used when operating the power supply as a constant current source with automatic crossover, using local setting of current control.

In this mode of operation, when the load voltage increases, due to changing load resistance, to the limit of the OUTPUT VOLTAGE control setting, the power supply crossover circuit will cause the unit to operate as a constant voltage supply.

CONNECTIONS FOR SERIES OPERATION

The voltage capability of LK power supplies can be extended by series operation of two LK power supplies of equal or unequal voltage ratings. A maximum of 200 volts can be connected between either the +DC or -DC terminal and chassis ground.

The two units are shown connected for series operation in figure 7. Figure 7 shows the series connection diagram which would be suitable for use in all applications.

Diodes CR_M and CR_S, which protect the units against reverse voltage, must be capable of withstanding the maximum rated current.

The series connection permits operation for either constant voltage or constant current with automatic crossover to either mode of operation whenever the respective limiting operating current or voltage is reached. Figure 7 shows connection for either local or remote sensing, when the series combination is operated for constant voltage; figure 7a shows the connection required when the series combination is operated for constant current.

CONNECTIONS FOR PARALLEL OPERATION

The current capability of LK power supplies can be extended by parallel operation of two LK power supplies of equal* voltage capacities. The two units are shown connected for parallel operation in figure 8. One power supply designated the (M) unit controls its own output as well as the output of the second power supply, designated the (S) unit.

*For applications using supplies of unequal voltage ratings, consult factory for details of operation.

Unit (S) operates to regulate its current in a ratio to that of the (M) unit by comparing the current in its internal sampling resistor with that current sampled by the master internal sampling resistor. When power supplies of unequal current capacities are parallel connected the division of current supplied will be approximately equal to the ratio of the current ratings of the supplies.

Parallel connected units can be operated for constant voltage with local sensing as well as for constant current with automatic crossover. When operating for constant voltage, the (M) unit can automatically cross over into constant current operation.

DETAILED OPERATING PROCEDURES

SAFETY NOTICE

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT. OBSERVE THE USUAL SAFETY PRECAUTIONS WHEN OPERATING OR SERVICING THE EQUIPMENT TO AVOID SHOCK OR INJURY.

CONSTANT VOLTAGE OPERATION, ADJUSTABLE CURRENT LIMIT

1. Remove AC power input to supply and place ON-OFF switch in OFF position before connecting load to the supply.

2. Determine load requirements, select wire size from figures 1 and 2 and choose desired type of supply-load connection from figures 3 and 4.

3. Connect supply to load as shown on the selected connection diagram.

NOTE: When shipped from the factory, the supply is ready for use as a constant current source with automatic crossover or as a local-sensing constant voltage source. Jumpers are connected at the factory as shown in figure 3. Take care to remove the appropriate jumpers for load requirements that need different supply-load connections. Refer to the appropriate connection diagram.

4. Turn OUTPUT VOLTAGE control knobs to the desired voltage setting.

5. When current to the load must be limited to an intermediate value within the current rating of the supply, turn the CURRENT LIMITER control knobs to the desired current limit setting. If no intermediate current limit is required, turn the control knobs CW to the position for full current rating for the maximum ambient temperature of operation Refer to section on specifications.

6. Apply AC power to supply

7. Place ON-OFF switch in ON position and check that red indicator is lit.

8. Check that output current and output voltage meters indicate desired values; as required, adjust OUTPUT VOLTAGE control knobs and CURRENT LIMITER control knobs to obtain correct meter indications. For non-metered models use externally connected meters and check that correct meter indications exist at output terminals 6 and 4; for remote sensing connections, check at the load terminations of sensing leads on terminals 3 and 7.

9. Power supply is now in proper operation.

PROGRAMMED CONSTANT VOLTAGE OPERATION, ADJUSTABLE CURRENT LIMIT

1. Remove AC power input to the supply and place ON-OFF switch in OFF position before connecting load to the supply.

2. Determine load requirements, select wire size and length from figures 1 and 2. Choose desired type of supply-load connection from figures 5 or 6. Refer to paragraph on Programmed Voltage Connections.

3. Connect supply to load as shown on the selected connection diagram. As shown in figure 5, take care to use a shorting-type switch for the external programming control when several voltages are desired and the programming voltage method is not used.

4. Turn OUTPUT VOLTAGE control knobs to the extreme CCW position. Adjust external programming voltage control to desired voltage setting.

5. When current to the load must be limited to an intermediate value within the current rating of the supply, turn the CURRENT LIMITER control knobs to the desired current limit setting. If no intermediate current limit is desired, turn the control knobs CW to the position for full rated current for the ambient temperature of operation. Refer to section on specifications.

6. Apply AC power to the supply.

7. Place ON-OFF switch in ON position and check that red indicator is lit.

8. Check that output current and output voltage meters indicate desired values; as required, adjust CURRENT LIMITER knobs and external programming voltage control to obtain correct meter indications. For non-metered models use externally connected meters and check that correct meter indications exist at output terminals 4 and 6; for remote sensing connections check at the load terminations of sensing leads on terminals 3 and 7.

9. Power supply is now operating properly.

CONSTANT CURRENT OPERATION WITH CROSSOVER, ADJUSTABLE VOLTAGE LIMIT

1. Remove AC power input to the supply and place ON-OFF switch in OFF position before connecting load to the supply.

2. Determine load requirements and connect load to the supply as shown in figure 3.

3. Turn the CURRENT LIMITER knobs to the desired current setting.

4. When load voltage must be limited to an intermediate value within the voltage rating of the supply, turn OUTPUT VOLTAGE control knobs to the desired voltage limit setting. If no intermediate voltage limit, within rating of supply is desired, turn control knobs to the full CW position to obtain voltage limit at maximum voltage rating of the supply.

5. Apply AC power to the supply.

6. Place ON-OFF switch in ON position and check that red indicator is lit.

7. Check that output current and output voltage meters indicate desired values; adjust OUTPUT VOLTAGE control knobs and CURRENT LIMITER control knobs as required to obtain correct indications. For non-metered models use externally connected meters and check that correct meter indications exist at output terminals 4 and 6.

8. Power supply is now in proper operation.

SERIES CONNECTION CONSTANT VOLTAGE OPERATION, WITH CURRENT LIMIT

1. Remove AC power input to the (B) and (A) units and place ON-OFF switches in OFF position before connecting load to the supplies.

2. Determine load requirements, select wire size from figures 1 and 2 and choose correct type of series supply-load connections from figure 7. Refer to paragraph on Connections for Series Operation.

3. Connect supply to load as shown on the selected connection diagram. As required, select diodes CR_S and CR_M in accordance with instructions contained in Connections for Series Operation.

4. Turn (A) and (B) unit OUTPUT VOLTAGE control knobs to the desired total voltage setting.

5. When current to the load must be limited to an intermediate value within current rating of the units, turn each CURRENT LIMITER control knob to the desired setting. If no intermediate current limit is required, turn the control knobs of each unit CW to the position for full current rating for the maximum ambient temperature of operation. Refer to section on specifications.

NOTE: When units of unequal current rating are series connected, the unit with the lower current rating must be capable of delivering the desired load current.

6. Apply AC power to the supplies.

7. Place ON-OFF switches of both units in ON position and check that red indicators are lit.

8. Check that output current and output voltage meters indicate desired values; total voltage is equal to sum of (A) and (B) units. As required, adjust OUTPUT VOLTAGE control knobs and CURRENT LIMITER control knobs of both units to obtain correct indications. For non-metered models use externally connected meters and check that correct meter indications exist at output terminals of both units; positive (+) terminal of (A) unit and minus (-) terminal of the (B) unit are the output terminals of the series combination.

For remote sensing connection, make checks at the load terminations of sensing leads from terminal 7 of (A) and from terminal 3 connection of (B) unit.

9. Power supplies are now in proper operation.

PARALLEL CONNECTION CONSTANT VOLTAGE OPERATION, WITH CURRENT LIMIT

1. Remove AC power input to each supply and place ON-OFF switch on both (M) and (S) units in OFF position before connection load to the supplies.

2. Determine load requirements, select wire size from figures 1 and 3 in the manual. Refer to paragraph on Connections for Parallel Operation.

3. Connect supplies to load as shown in connection diagram, figure 8.

NOTE: When shipped from the factory, each supply is ready for use as a constant current source or as a local-sensing constant voltage source. Jumpers are connected at the factory. Take care to remove the appropriate jumpers for load requirements that need different supply-load connections. Refer to the appropriate connection diagram.

4. Turn OUTPUT VOLTAGE control knobs on the (M) unit to the desired voltage setting, and turn the OUTPUT VOLTAGE control knobs on the (S) unit to fully CCW position.

5. When current to the load must be limited to an intermediate point, turn the CURRENT LIMITER control knobs on both the (M) and (S) units to the desired current limit setting. Set current limit control on the (M) and (S) units to the position indicating the current value to be delivered by the respective unit. If no intermediate current limit is desired, turn the CURRENT LIMITER control knobs CW on both (M) and (S) units to the position for full rated current for the maximum ambient temperature of operation. Refer to section on specifications.

6. Apply AC power to each supply.

7. Place ON-OFF switches on (M) and (S) units in ON position and check that red indicators are lit.

8. Check that output current and output voltage meters on both (M) and (S) units indicate desired values; as required, adjust OUTPUT VOLTAGE control and CURRENT LIMITER control on (M) unit to obtain correct meter indications. For non-metered models use externally connected meters and check that correct meter indications exist at output terminals 4 and 6 of the (M) unit.

9. Power supplies are now in proper operation.

OPERATION AFTER PROTECTIVE DEVICE SHUTDOWN

Thermostat Shutdown

The thermostat opens the input circuit only when the temperature of the transistor heat radiator exceeds a maximum safe value. The thermostat will automatically reset when the temperature of the radiator decreases to safe operating value. After eliminating the cause(s) for overheating and allowing time for the power supply to cool to a proper temperature, resume operation of the supply. Refer to appropriate operation paragraph in DETAILED OPERATING PROCEDURES.

Fuse Shutdown

Internal component failure is prevented by fuses which protect the components from damage caused by excessive currents. Fuses will blow when the maximum rated current value for the fuse is exceeded. Fatigue failure of fuses can occur when mechanical vibrations from the installation combine with thermally induced stresses to weaken the fuse metal. Many fuse failures are caused by a temporary condition and replacing the blown fuse will make the fuse protected circuit operative.

MAINTENANCE

GENERAL

This section describes trouble analysis routine, replacement procedures, calibration and test procedures that are useful for servicing the Lambda power supply. Refer to the section on specifications and features for the minimum performance standards.

TROUBLE ANALYSIS

Whenever trouble occurs, systematically check all fuses, primary power lines, external circuit elements, and external wiring for malfunctions before trouble shooting the equipment. Failures and malfunctions often can be traced to simple causes such as improper jumper and supply-load connections or fuse failure due to metal fatigue.

CHECKING TRANSISTORS AND CAPACITORS

Check transistors with an in-circuit transistor checker. If no checker is available, transistors can be checked with an ohmmeter that has a highly limited current capability. Observe proper polarity for PNP or NPN to avoid error in measurement. The forward transistor resistance is low but never zero; backward resistance is always higher than the forward resistance.

Do not assume trouble is eliminated when only one part is replaced. This is especially true when one transistor fails, causing other transistors to fail. Replacing only one transistor and turning power on, before checking for additional defective components could damage the replaced component.

When soldering semi-conductor devices, hold the lead being soldered with a pair of pliers placed between the component and the solder joint to provide an effective heat sink.

> NOTE: The leakage resistance obtained from a simple resistance check of a capacitor is not always an indication of a faulty capacitor. In all cases the capacitors are shunted with resistances, some of which have low values. Only a dead short is a true indication of a shorted capacitor.

PRINTED CIRCUIT BOARD MAINTENANCE TECHNIQUES

1. If foil intact but not covered with solder it is a good contact. Do not attempt to cover with solder.

2. Voltage measurements can be made from either side of the board. Use a needle-point probe to penetrate to the wiring whenever a protective coating is used on the wiring. A brass probe can be soldered to an alligator clip adapted to measuring instrument.

3. Always use a heat sink when soldering transistors; atransistor pad with mounting feet is an effective heat sink.

4. Broken or damaged printed wiring is usally the result of an imperfection, strain or careless doldering. To repair small breaks, tin a short piece of hook-up wire to bridge the break, and holding the wire in place, flow solder along the length of wire so that it becomes part of the circuitry.

5. When unsoldering components from the board never pry or force loose the part; unsolder the component by using the wicking process described below:

(a) Select a 3/16 inch tinned copper braid for use as a wick; if braid is not available, select AWG No. 14 or No. 16 stranded wire with 1/2 inch insulation removed.

(b) Dip the wick in liquid rosin flux.

(c) Place the wick onto the soldered connection and apply soldering iron onto the wick.

(d) When sufficient amount of solder flows onto the wick, freeing the component, simultaneously remove iron and wick.

ADJUSTMENT OF CALIBRATION CONTROLS

Whenever parts are replaced, adjust calibration controls only when voltage and current indications are improper and do not reflect maximum ratings.

Adjust Maximum Output Voltage Set Control R272as Follows

1. Remove AC power input to the supply and place ON-OFF switch in OFF position.

2. Unsolder wiper of R272from resistor housing.

3. Operate the power supply for constant voltage with local-sensing jumpers connected as shown in figure 3, and no external load.

4. Turn OUTPUT VOLTAGE control knobs fully clockwise and, using a DC voltmeter of one percent accuracy or better, adjust R272to provide output voltage E_O MAX + 0.20 volts; where E_O MAX is the rated output voltage of the supply.

5. After adjustment is completed, remove AC power input to the supply and solder wiper of R272to potentiometer housing.

Adjust Maximum Output Current Set Control R255 as Follows:

1. Remove AC power input to the supply and place ON-OFF switch in OFF position.

2. Unsolder wiper of R255 from resistor housing.

3. Turn OUTPUT VOLTAGE control knobs and CURRENT LIMITER control fully CW.

4. Operate the power supply for constant current crossover, connected as shown in figure 3, with a short circuit across the output terminals.

5. Adjust R255 for 105% of rated current output at 40°C ambient, using any DC ammeter of one percent accuracy or better.

6. After adjustment is completed, remove the power input to the supply and solder wiper of R255 to potentiometer housing.

Adjust Series Regulator Voltage Set Control R152 as Follows:

1. Remove AC power input to the supply and place ON-OFF switch in OFF position.

2. Unsolder wiper of R152 from resistor housing.

3. Turn OUTPUT VOLTAGE control knobs and CURRENT LIMITER control knobs fully CW.

4. Connect DC voltmeter of one percent accuracy or better, between output terminal 6 and collector at Q302.

5. Connect power supply for constant voltage operation with local sensing jumpers connected as shown in figure 3.

6. Connect resistive load. Calculate load value as follows:

$$R\ LOAD = \frac{E_{MAX}}{I_{MAX}} \text{ at } 40°C$$

7. Provide AC input power of 132 VAC to supply and place ON-OFF switch in ON position.

8. Adjust R152 until voltmeter indicates applicable voltage listed here for the appropriate LK model.

MODEL	VOLTMETER INDICATION
LK340	8.0 VDC
LK341	8.0 VDC
LK342	8.5 VDC
LK343	10.0 VDC
LK344	12.0 VDC
LK345	12.0 VDC

PERFORMANCE CHECKS

Checks With Constant Voltage Operation

Check the ripple and regulation of the power supply using the test connection diagram shown in figure 9. Use suggested test equipment or equivalent to obtain accurate results. Refer to SPECIFICATIONS AND FEATURES for minimum performance standards.

Set the differential meter, DC VTVM (John Fluke Model 801H or equivalent) to the selected power supply operating voltage. Check the power supply load regulation accuracy while switching from the load to no-load condition. Long load leads should be a twisted pair to minimize AC pick-up.

Use a Variac to vary the line voltage from 105-132 or 132-105 volts AC and check the power supply line regulation accuracy on the VTVM differential meter.

Use a VTVM, Ballatine 320 or equivalent, to measure rms ripple voltage of the power supply DC output.

Checks With Constant Current Operation

Check the regulation of the power supply using the test connection diagram shown in figure 10. Refer to SPECIFICATIONS AND FEATURES for minimum performance standards.

Check the power supply load regulation accuracy while switching from the short circuit to load condition. Measure the voltage across sensing resistor Rs. Use John Fluke Model 801H or equivalent for the VTVM connected across Rs. For Rs, use a resistor having value Rs = $\frac{1}{Iout}$

To obtain regulation figure, substitute values obtained into regulation formula:

$$\frac{\Delta E}{Rs} = \text{Regulation in milliamperes,}$$

where ΔE is the voltage change in millivolts and Rs is the resistance of the sensing resistor.

Use a Variac to vary the line voltage from 105-132 or 132-105 volts A and check the power supply line regulation accuracy using VTVM and the regulation formula:

$$\frac{\Delta E}{Rs}$$

SERVICE

When additional instructions are required or repair service is esired, contact the nearest office of the Lambda Electronics Corp. here trained personnel and complete facilities are ready to assist ou.

Please include the power supply model and serial number together ith complete details of the problem. On receipt of this information, ambda will supply service data or advise shipping for factory repair ervice.

All repairs not covered by the warranty will be billed at cost and n estimate forwarded for approval before work is started.

PARTS ORDERING

Standard components and special components used in Lambda power upply can be obtained from the factory. In case of emergency, ritical spare parts are available through any Lambda office.

The following information must be included when ordering parts:

1. Model number and serial number of power supply and purchase date.
2. Lambda part number.
3. Description of part together with circuit designation.
4. If part is not an electronic part, or is not listed, provide a description, function, and location of the part.

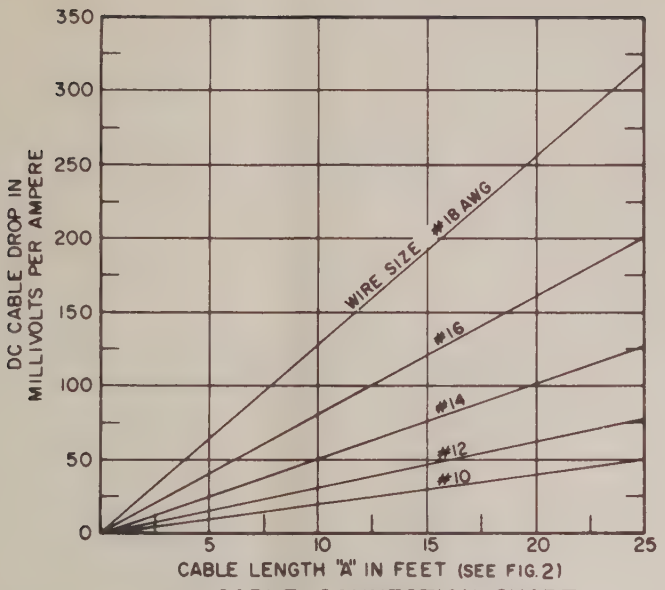


FIG. 1. CABLE CONNECTION CHART

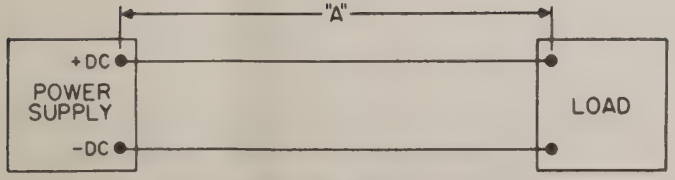
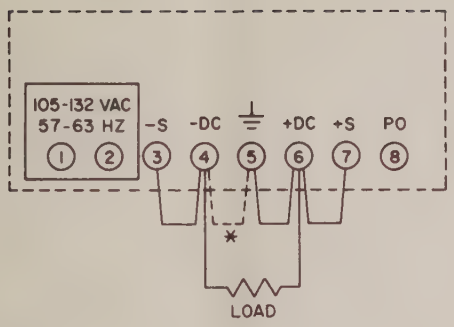
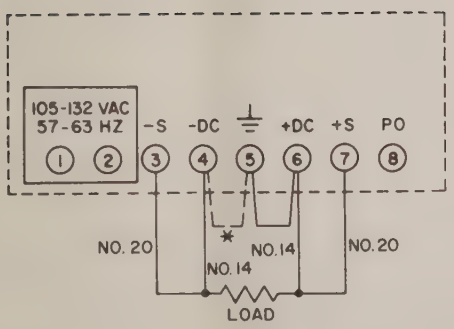


FIG. 2. CABLE LENGTH "A" IN FEET



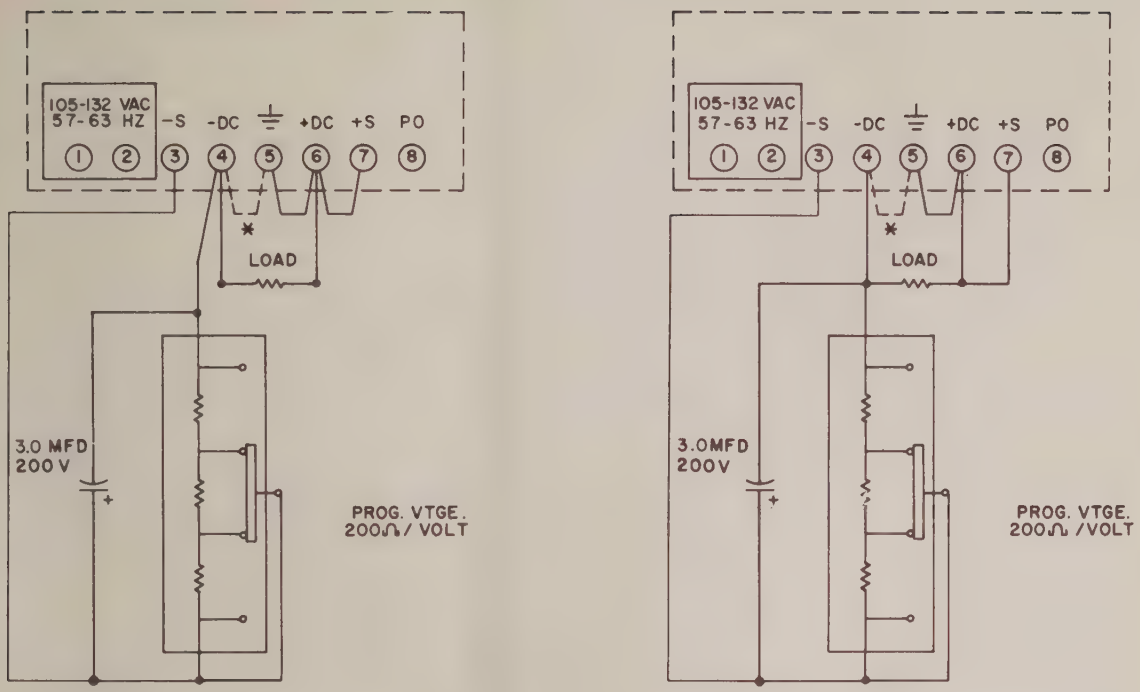
NOTE:
* FOR NEGATIVE GROUND, DISCONNECT JUMPER FROM TERMINALS 5 AND 6 AND RECONNECT TO TERMINALS 4 AND 5.

FIGURE 3 TWO-WIRE CONNECTION, FOR CV + CC



NOTE:
* FOR NEGATIVE GROUND, DISCONNECT JUMPER FROM TERMINALS 5 AND 6 AND RECONNECT TO TERMINALS 4 AND 5.

FIGURE 4 FOUR-WIRE CONNECTION CV

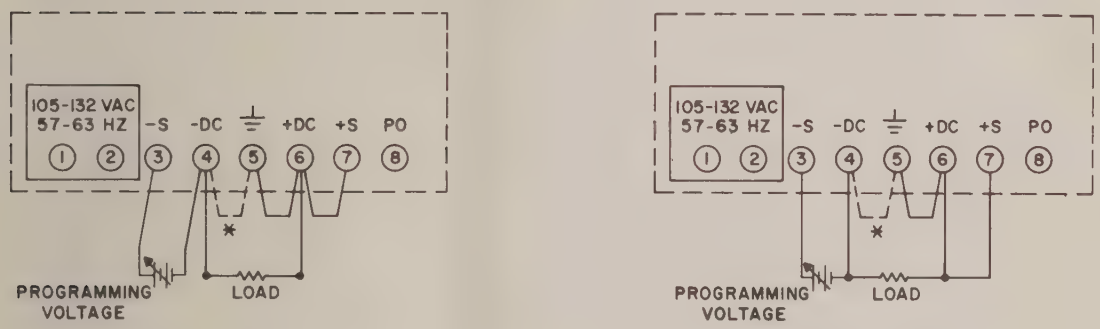


(A) LOCAL SENSING

(B) REMOTE SENSING

NOTE:
* FOR NEGATIVE GROUND, DISCONNECT JUMPER FROM TERMINALS 5 AND 6 AND RECONNECT TO TERMINALS 4 AND 5.

FIGURE 5 PROGRAMMED VOLTAGE, WITH EXTERNAL RESISTOR

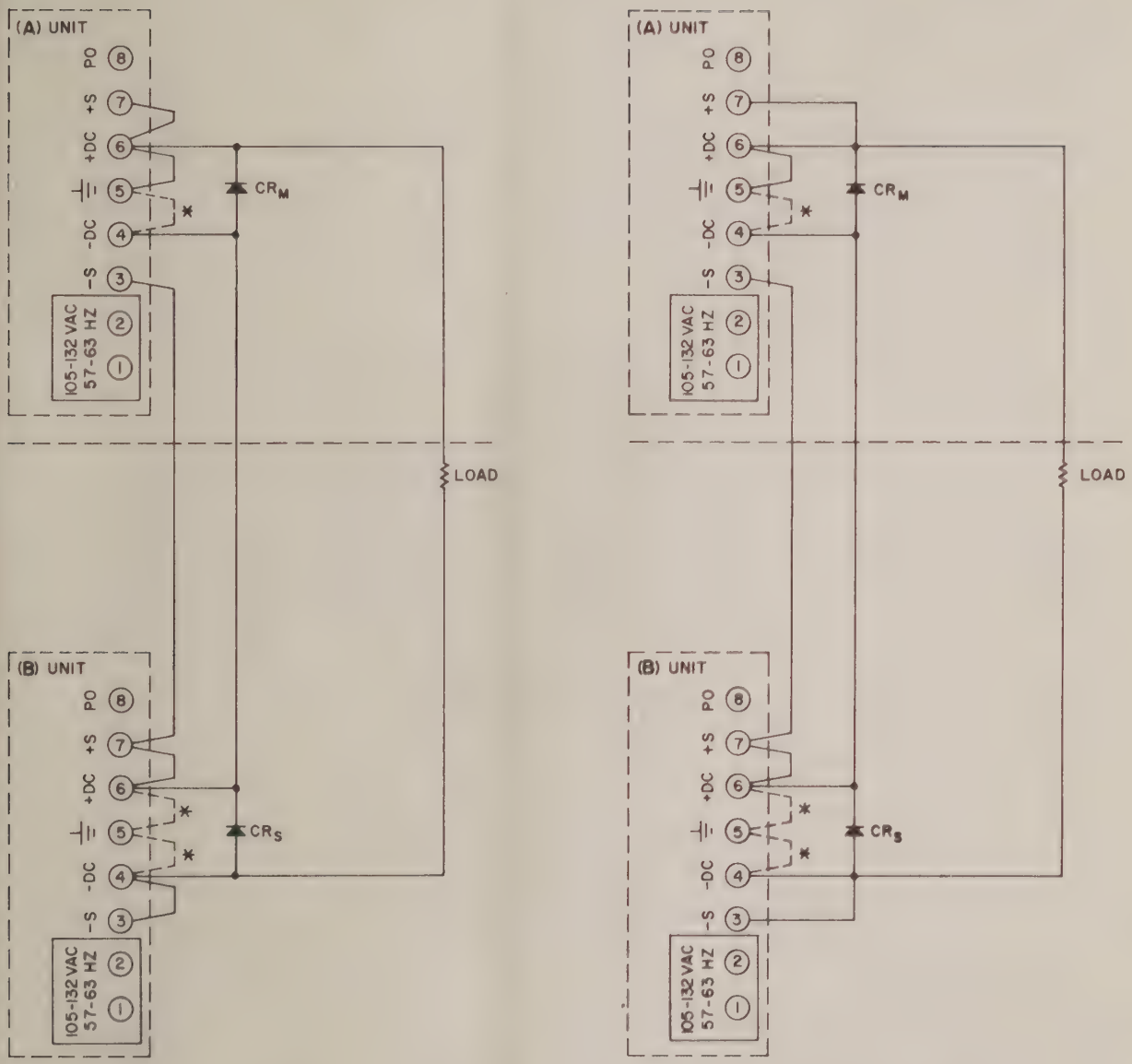


(A) LOCAL SENSING

(B) REMOTE SENSING

NOTE:
* FOR NEGATIVE GROUND, DISCONNECT JUMPER FROM TERMINALS 5 AND 6 AND RECONNECT TO TERMINALS 4 AND 5.

FIGURE 6 PROGRAMMED VOLTAGE, WITH EXTERNAL PROGRAMMING VOLTAGE SOURCE



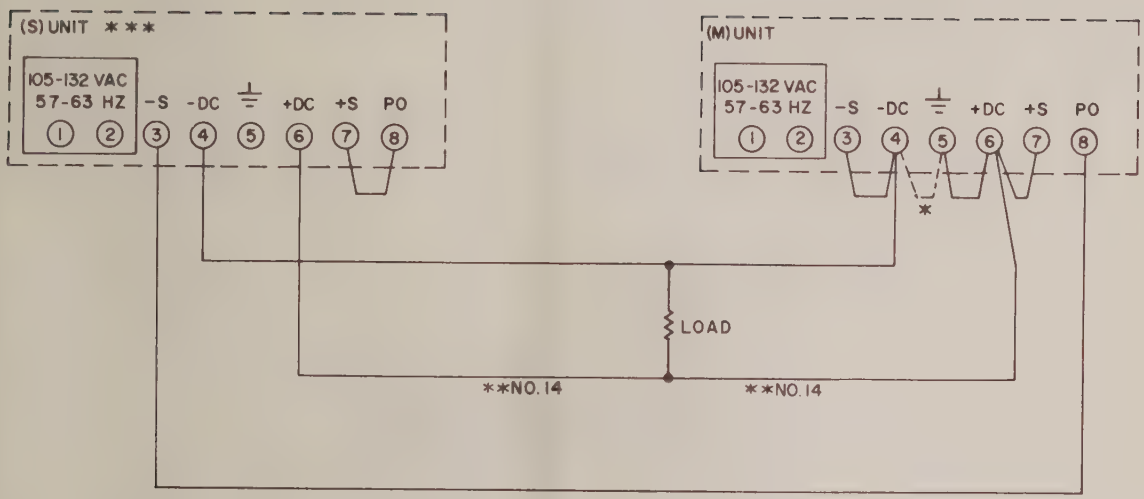
(A) LOCAL SENSING

(B) REMOTE SENSING

NOTE:

* MAKE ONLY ONE GROUND CONNECTION FOR THE SERIES COMBINATION, TO CHANGE GROUND AS SHOWN, REMOVE JUMPER FROM TERMINALS 5 AND 6 ON (M) UNIT AND CONNECT ANY ONE OF THE OTHER JUMPERS AS SHOWN IN DOTTED LINE.

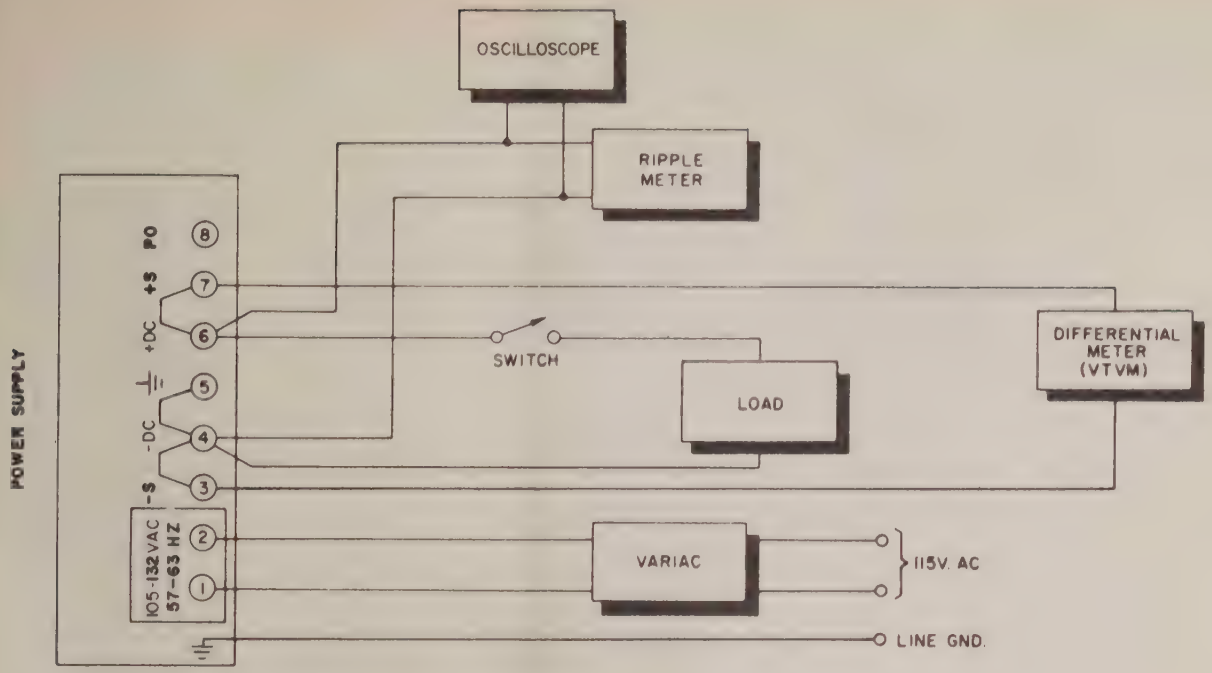
FIGURE 7 SERIES CONNECTION



***CAUTION: VOLTAGE CONTROLS OF (S) UNIT MUST BE SET FOR ZERO VOLTS OUTPUT.

NOTE:
*FOR NEGATIVE GROUND, DISCONNECT JUMPER FROM TERMINALS 5 AND 6 AND RECONNECT TO TERMINALS 4 AND 5.
**FOR IMPROVED CURRENT BALANCING, THE "+DC" LEADS MUST BE THE SAME LENGTH AND SIZE.

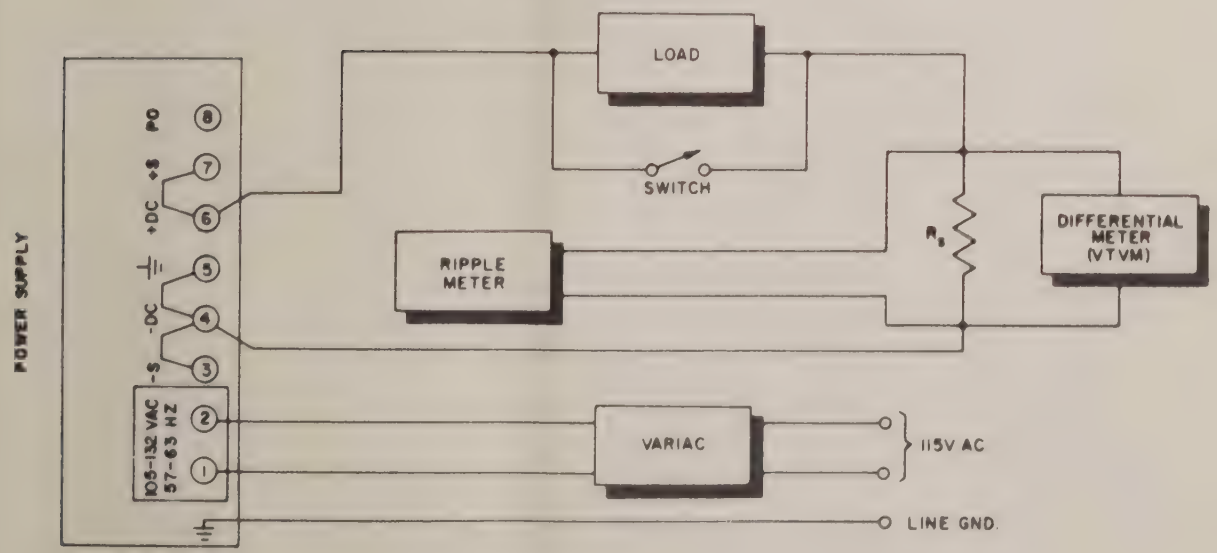
FIGURE 8 PARALLEL CONNECTION, LOCAL SENSING



NOTES

1. REGULATION AND RIPPLE CHECK METERS MUST NOT BE GROUNDED THROUGH THREE-WIRE LINE CORD TO GROUND
2. PERFORM CHECKS WITH LOCAL SENSING CONNECTIONS ONLY.

FIGURE 9 TEST CONNECTIONS FOR CONSTANT VOLTAGE PERFORMANCE CHECKS



NOTES

1. REGULATION AND RIPPLE CHECK METERS MUST NOT BE GROUNDED THROUGH THREE-WIRE LINE CORD TO GROUND
2. PERFORM CHECKS WITH LOCAL SENSING CONNECTIONS ONLY

FIGURE 10 TEST CONNECTIONS FOR CONSTANT CURRENT PERFORMANCE CHECKS

SCB-342A

10. COMPONENT VALUES DESIGNATED HERE REFER TO MODEL LK340 ONLY.

COMP. DESIG.	VALUE
M1	0-20 V
M2	0-10 A
F2	15 A
C152	0.047 μf, 80 V
C154	0.015 μf, 200 V
C303	1900 μf, 30 V
C305	11,500 μf, 35 V
CR301	FBP-00-003
R171	220 K
R172	220 K
R313A	0.3
R313B	0.3
R327	3.9 K
R301B	3.8 K
Q171	FBN-L113
Q302	FBN-36485
Q303	FBN-36485
Q304	FBN-36485
CR302	FBM-Z113

NOTES

1 RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE NOTED

2 RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED

3 RESISTOR TOLERANCES: COMPOSITION ±10%; WIREWOUND ±5% UNLESS OTHERWISE NOTED.

4 CAPACITOR TOLERANCES: ELECTROLYTIC, -10% +100%; TANTALUM, ±20%, PAPER, ±10%, CERAMIC, ±20%, MICA, ±20%, MYLAR, ±10%; UNLESS OTHERWISE NOTED

5 SYMBOLS

- INDICATES CLOCKWISE ROTATION OF SHAFT.
- INDICATES CONNECTION TO CHASSIS
- INDICATES ADJUSTMENT OR CALIBRATION CONTROL
- INDICATES ACTUAL UNIT MARKING.
- INDICATES FRONT-PANEL MOUNTED COMPONENT.
- * INDICATES FACTORY ADJUSTMENT; SEE INSTRUCTION MANUAL.
- INDICATES TRANSFORMER LUG TERMINAL.
- THIS DIODE IS LAMBDA PART NO. FBL-00-030; CAN BE REPLACED WITH STANDARD TYPE IN645 OR IN4002 DIODE UNLESS OTHERWISE NOTED.

6. CONDITIONS FOR CIRCUIT POINT VOLTAGE MEASUREMENTS

A CONSTANT VOLTAGE

READ ITALICIZED NUMBERS FOR CIRCUIT POINT VOLTAGES WHILE IN CONSTANT VOLTAGE OPERATION
INPUT: 120 VAC, 60 HZ
OUTPUT: MAX RATED VOLTAGE, OUTPUT CURRENT ZERO

B CONSTANT CURRENT

READ NUMBERS IN PARENTHESES FOR CIRCUIT POINT VOLTAGES WHILE IN CONSTANT CURRENT OPERATION
INPUT: 120 VAC, 60 HZ, 30° AMBIENT
OUTPUT: 0 VOLTS, OUTPUT CURRENT MAX. RATED CURRENT (SHORT CIRCUIT)

INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED

DC MEASUREMENTS TAKEN WITH 20,000 OHMS/VOLT VOLTMETER BETWEEN -DC (TERM. 4) AND INDICATED POINTS UNLESS OTHERWISE NOTED.

7 DESIGNATIONS ARE LAMBDA PART NUMBERS.

8 ◯ INDICATES TERMINAL LOCATED ON TERMINAL BOARD "C", OR PRINTED WIRING BOARDS "A", "B".

9 COAT BOTH SIDES OF MICA WASHER OR ANODIZED ALUMINUM WAFER WITH DOW CORNING NO. 340 SILICONE GREASE

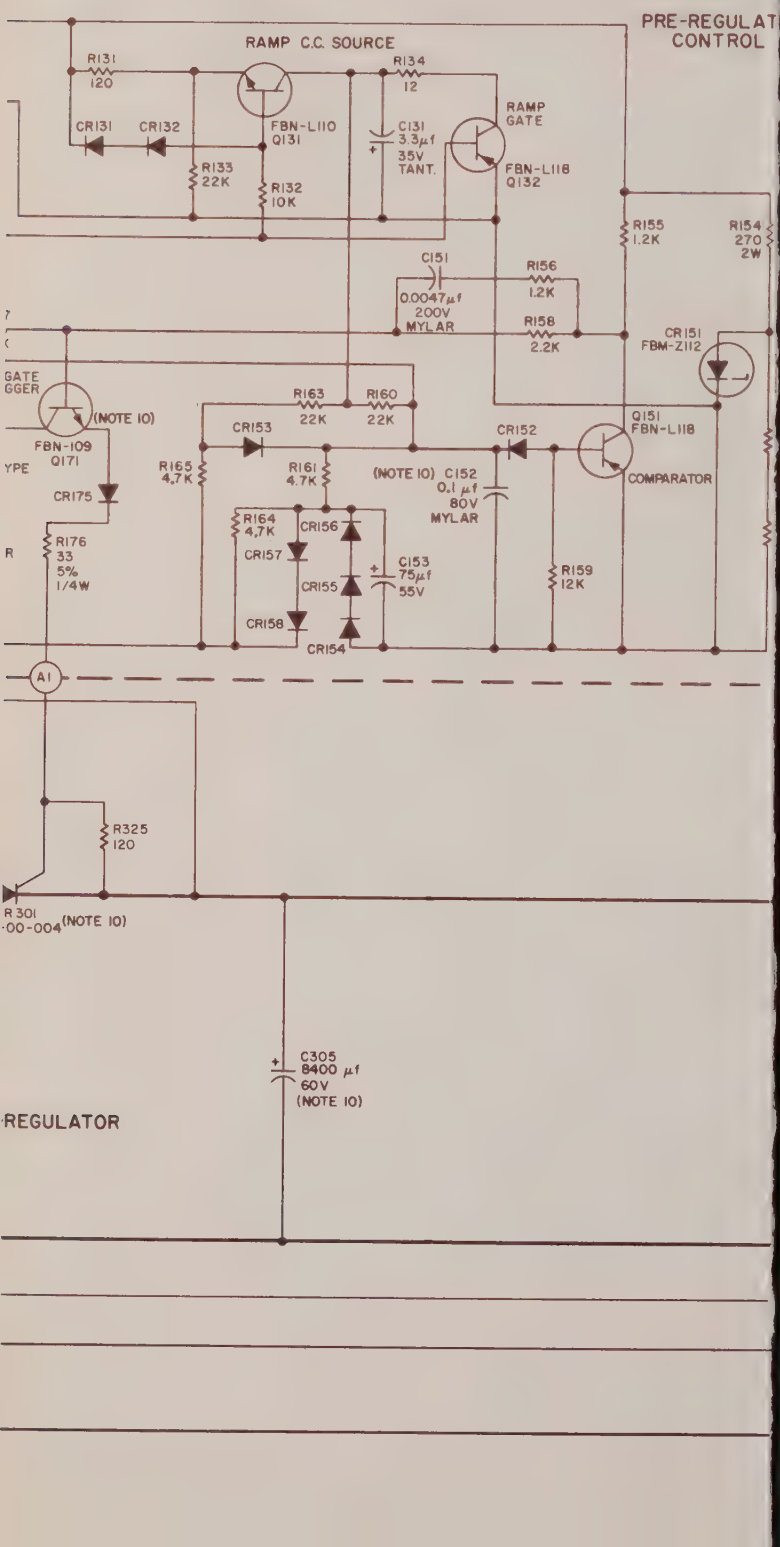
CAUTION
NOT AT CHASSIS GROUND POTENTIAL
DO NOT SHORT TO CHASSIS GROUND

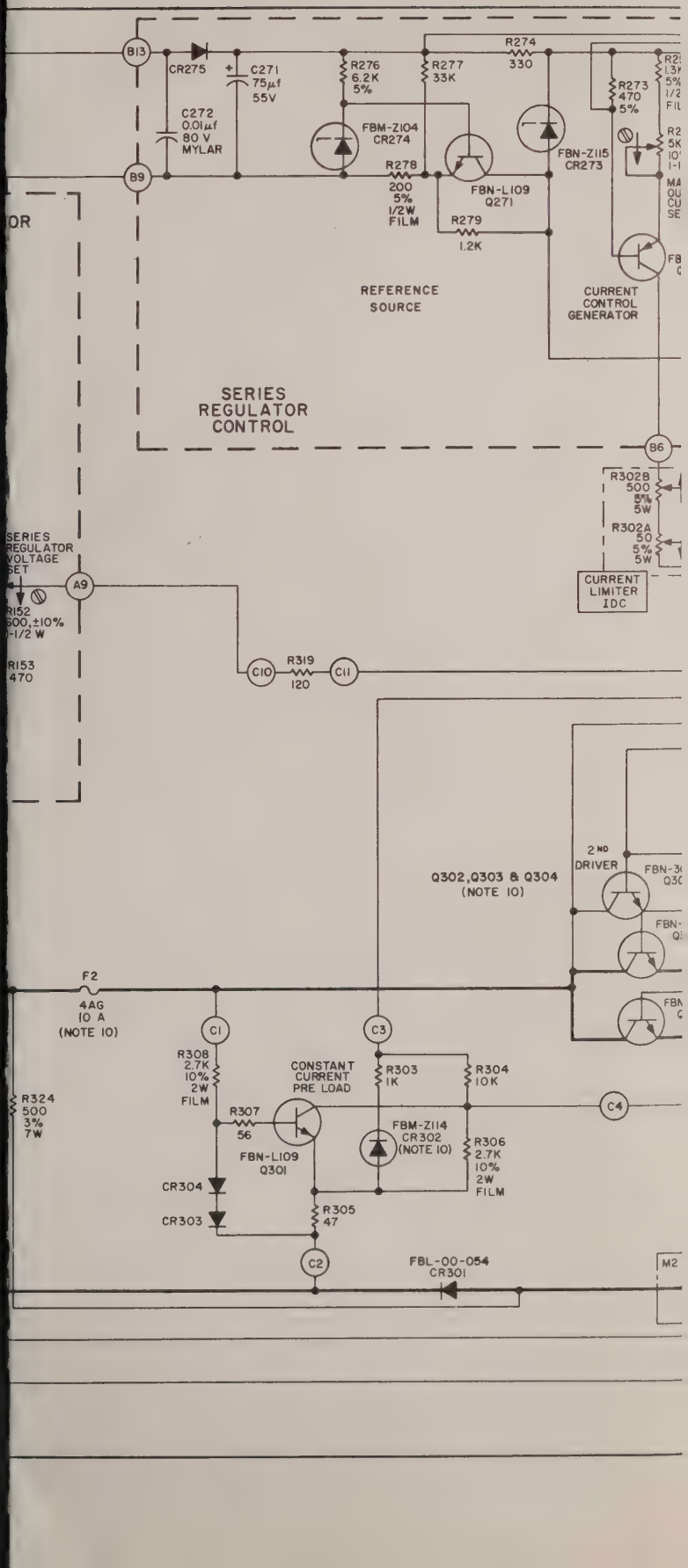
NOTE 9
MICA INSULATING WASHER
CHASSIS GROUND

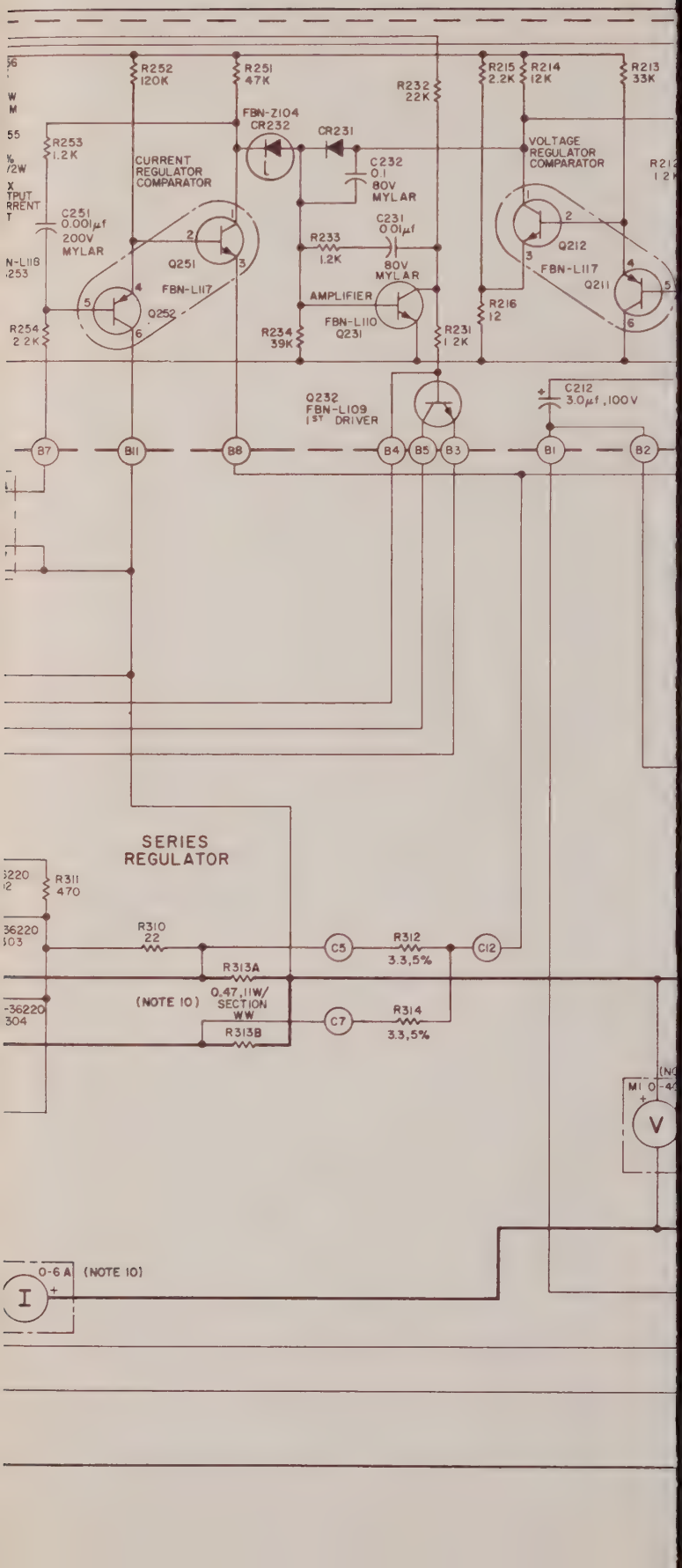
COLLECTOR (CASE)
BASE
EMITTER
TRANSISTOR, PIN VIEW

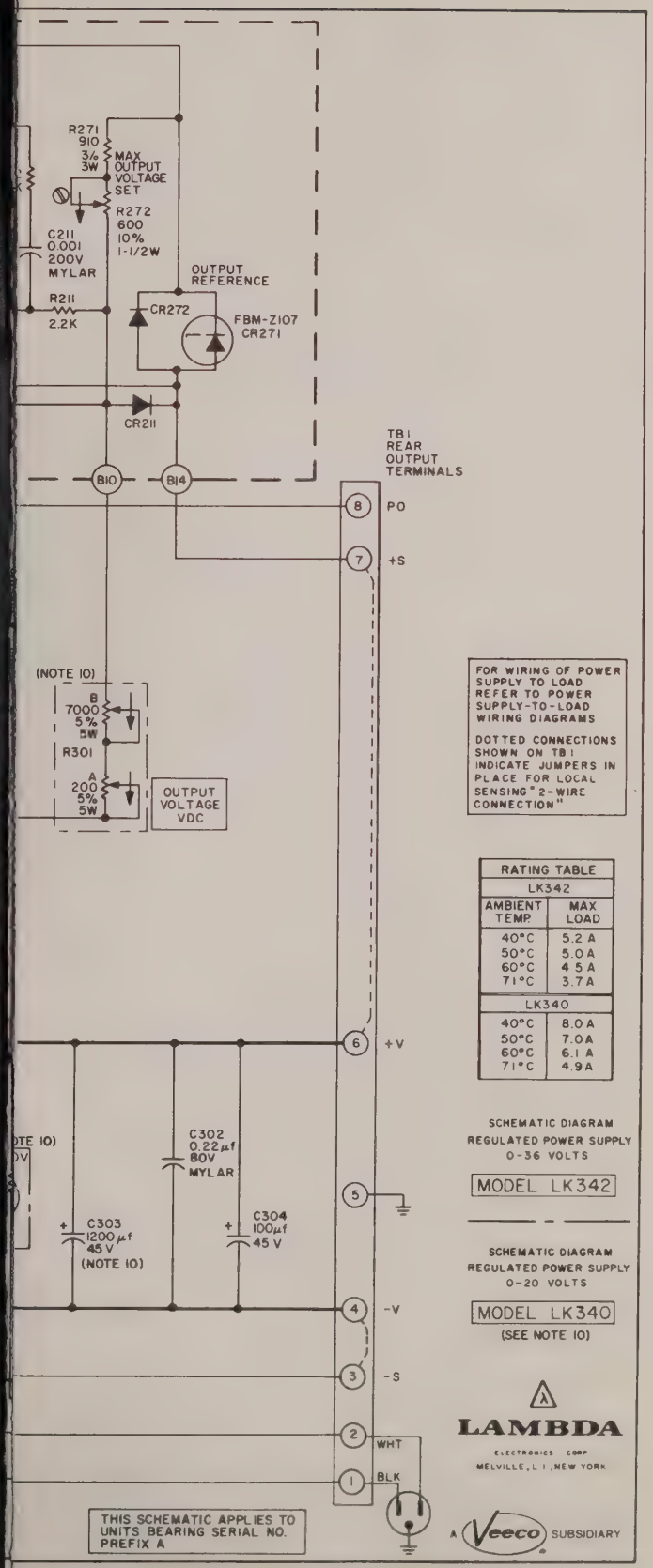
DUAL COMPLEMENTARY TRANSISTOR, PIN VIEW
Q251, Q252
Q211, Q212

T1
A11
A8
A7
A4
A3
CR116
CR112
CR114
CR111
CR113
CR115
C112 200μf 25 V
R111 300 3% 3W
C111 40μf 35V
R15 47
(NOTE 10)
R162 1K
SCR TRI
R172 470K 1/4W
C172 0.01μf 80V MYLAR
C154 0.0047μf 200V MYLAR
R171 470K 1/4W
R175 39 FUSE T WW
CR171
C171 0.1μf 200V MYLA
C301 0.1μf 400V MYLAR
DS1
C315 0.068μf 400V MYLAR
L301 BBA-340
CR308
CR307
FBL-00-054 (4)
R327 15K ±5% 1W (NOTE 10)
R328 4 3W
CR305
CR306
C311 1.0μf 200V MYLAR
F1 3AG 10 A SLO-BLO
S1
ON
OFF
PRE-


PRE-REGULAT
CONTROL
RAMP C.C. SOURCE
R131
120
R134
12
CR131
CR132
FBN-L110
Q131
C131
3.3μf
35V
TANT.
RAMP
GATE
FBN-L118
Q132
R133
22K
R132
10K
R155
1.2K
R154
270
2W
C151
0.0047μf
200V
MYLAR
R156
1.2K
R158
2.2K
CR151
FBM-Z112
GATE
GGER
(NOTE 10)
FBN-109
Q171
R163
22K
R160
22K
CR153
CR152
Q151
FBN-L118
COMPARATOR
YPE
R165
4.7K
R161
4.7K
(NOTE 10) C152
0.1 μf
80V
MYLAR
CR175
R164
4.7K
CR156
CR157
CR155
CR158
CR154
C153
75μf
55V
R159
12K
R176
33
5%
1/4W
A1
R325
120
R301
00-004 (NOTE 10)
C305
8400 μf
60V
(NOTE 10)
REGULATOR


B13
CR275
C271
75µf
55V
C272
0.01µf
80 V
MYLAR
B9
R276
6.2K
5%
R277
33K
R274
330
R273
470
5%
FBM-Z104
CR274
FBN-Z115
CR273
R278
200
5%
1/2W
FILM
FBN-L109
Q271
R279
1.2K
REFERENCE
SOURCE
CURRENT
CONTROL
GENERATOR
SERIES
REGULATOR
CONTROL
B6
R3028
500
5%
5W
R302A
50
5%
5W
CURRENT
LIMITER
IDC
SERIES
REGULATOR
VOLTAGE
SET
A9
C10
R319
120
C11
Q302,Q303 & Q304
(NOTE 10)
2ND
DRIVER
F2
4AG
10 A
(NOTE 10)
C1
C3
R308
2.7K
10%
2W
FILM
CONSTANT
CURRENT
PRE LOAD
R303
1K
R304
10K
C4
R324
500
3%
7W
R307
56
FBN-L109
Q301
FBM-Z114
CR302
(NOTE 10)
R306
2.7K
10%
2W
FILM
CR304
CR303
R305
47
C2
FBL-00-054
CR301
M2

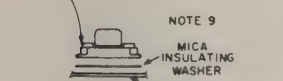

R252 120K
R251 47K
R232 22K
R215 2.2K
R214 12K
R213 33K
FBN-Z104 CR232
CR231
R253 1.2K
CURRENT REGULATOR COMPARATOR
C232 0.1 80V MYLAR
VOLTAGE REGULATOR COMPARATOR
C231 0.01μf
C251 0.001μf 200V MYLAR
R233 1.2K
80V MYLAR
Q212
FBN-L117
Q211
Q251
FBN-L117
AMPLIFIER
R216 12
Q252
FBN-L110 Q231
R254 2.2K
R234 39K
R231 1.2K
Q232 FBN-L109 1ST DRIVER
C212 3.0μf, 100V
B7
B11
B8
B4
B5
B3
B1
B2
SERIES REGULATOR
R311 470
R310 22
C5
R312 3.3,5%
C12
R313A
(NOTE 10)
0.47, 11W/ SECTION WW
R313B
C7
R314 3.3,5%
M1 0-42
V
0-6 A
(NOTE 10)
I


R271
910
3%
3W
MAX
OUTPUT
VOLTAGE
SET
R272
600
10%
1-1/2W
C211
0.001
200V
MYLAR
R211
2.2K
OUTPUT
REFERENCE
CR272
FBM-Z107
CR271
CR211
B10
B14
TB1
REAR
OUTPUT
TERMINALS
8
PO
7
+S
(NOTE 10)
B
7000
5%
5W
R301
A
200
5%
5W
OUTPUT
VOLTAGE
VDC
FOR WIRING OF POWER SUPPLY TO LOAD REFER TO POWER SUPPLY-TO-LOAD WIRING DIAGRAMS
DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING "2-WIRE CONNECTION"
RATING TABLE
LK342
AMBIENT TEMP. | MAX LOAD
40°C | 5.2 A
50°C | 5.0 A
60°C | 4.5 A
71°C | 3.7 A
LK340
40°C | 8.0 A
50°C | 7.0 A
60°C | 6.1 A
71°C | 4.9 A
6
+V
C302
0.22µf
80V
MYLAR
5
C303
1200µf
45 V
(NOTE 10)
C304
100µf
45 V
4
-V
3
-S
2
WHT
1
BLK
SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY
0-36 VOLTS
MODEL LK342
SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY
0-20 VOLTS
MODEL LK340
(SEE NOTE 10)
LAMBDA
ELECTRONICS CORP
MELVILLE, L.I., NEW YORK
A Veeco SUBSIDIARY
THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIX A

NOTES

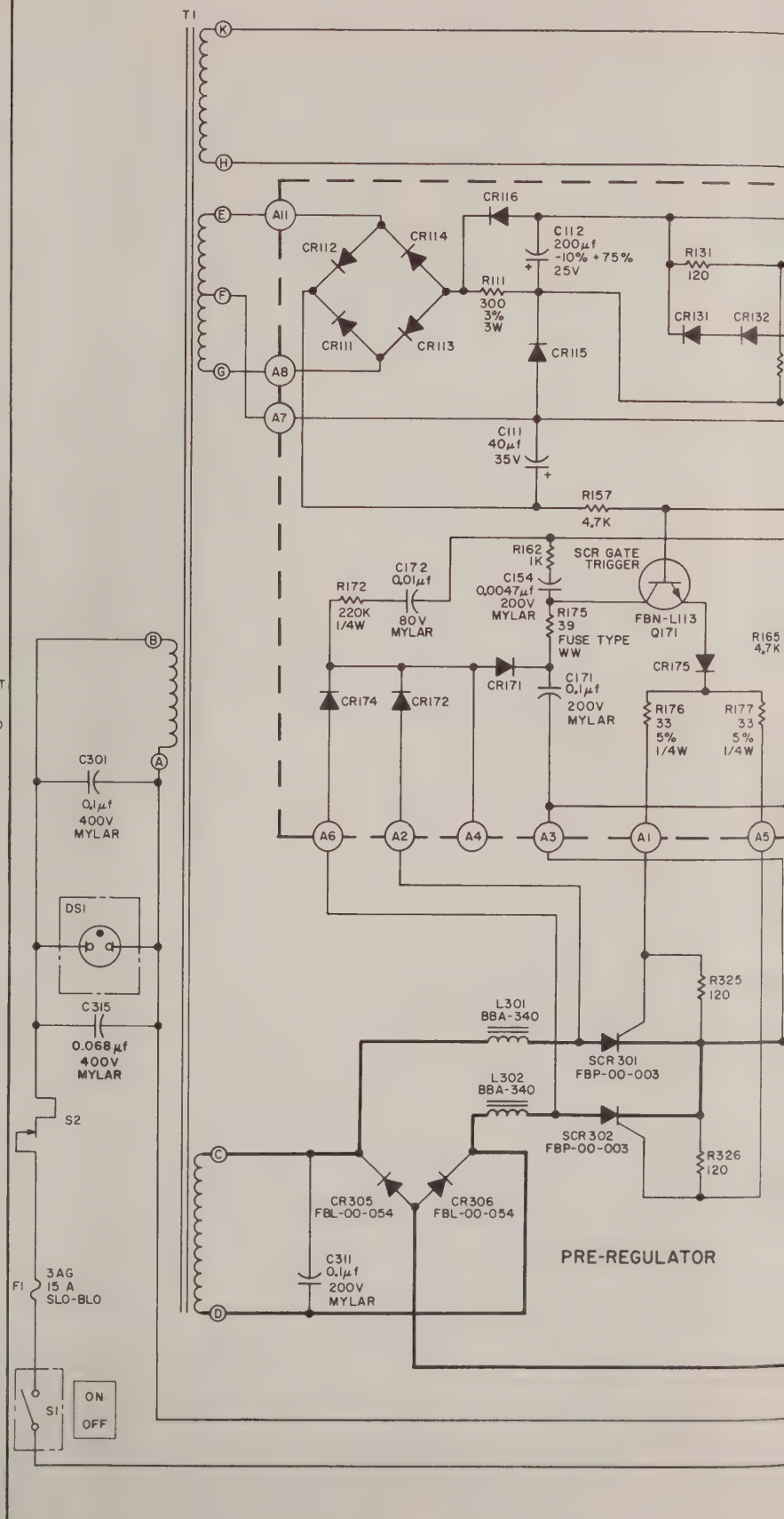
1. RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE NOTED.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED
3. RESISTOR TOLERANCES: COMPOSITION ±10%; WIREWOUND ±5% UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC, -10% +100%; TANTALUM, ±20%; PAPER, ±10%; CERAMIC, ±20%; MICA, ±20%, MYLAR, ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS
   - ↻ INDICATES CLOCKWISE ROTATION OF SHAFT.
   - ⏚ INDICATES CONNECTION TO CHASSIS.
   - ⊘ INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - ▭ INDICATES ACTUAL UNIT MARKING.
   - [▭] INDICATES FRONT-PANEL MOUNTED COMPONENT.
   - * INDICATES FACTORY ADJUSTMENT; SEE INSTRUCTION MANUAL.
   - ○ INDICATES TRANSFORMER LUG TERMINAL.
   - ▶| THIS DIODE IS LAMBDA PART NO. FBL-00-030; CAN BE REPLACED WITH STANDARD TYPE IN645 OR IN4002 DIODE UNLESS OTHERWISE NOTED.
6. CONDITIONS FOR CIRCUIT POINT VOLTAGE MEASUREMENTS.
   A. CONSTANT VOLTAGE
      READ ITALICIZED NUMBERS FOR CIRCUIT POINT VOLTAGES WHILE IN CONSTANT VOLTAGE OPERATION
      INPUT: 120 VAC, 60 HZ
      OUTPUT: MAX RATED VOLTAGE, OUTPUT CURRENT ZERO.
   B. CONSTANT CURRENT
      READ NUMBERS IN PARENTHESES FOR CIRCUIT POINT VOLTAGES WHILE IN CONSTANT CURRENT OPERATION
      INPUT: 120 VAC, 60 HZ, 30° AMBIENT.
      OUTPUT: 0 VOLTS, OUTPUT CURRENT MAX. RATED CURRENT (SHORT CIRCUIT)
   INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED.
   DC MEASUREMENTS TAKEN WITH 20,000 OHMS/VOLT VOLTMETER BETWEEN -DC (TERM. 4) AND INDICATED POINTS UNLESS OTHERWISE NOTED.
7. DESIGNATIONS ARE LAMBDA PART NUMBERS.
8. ◯ INDICATES TERMINAL LOCATED ON TERMINAL BOARD "C", OR PRINTED WIRING BOARDS "A", "B".
9. COAT BOTH SIDES OF MICA WASHER OR ANODIZED ALUMINUM WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.

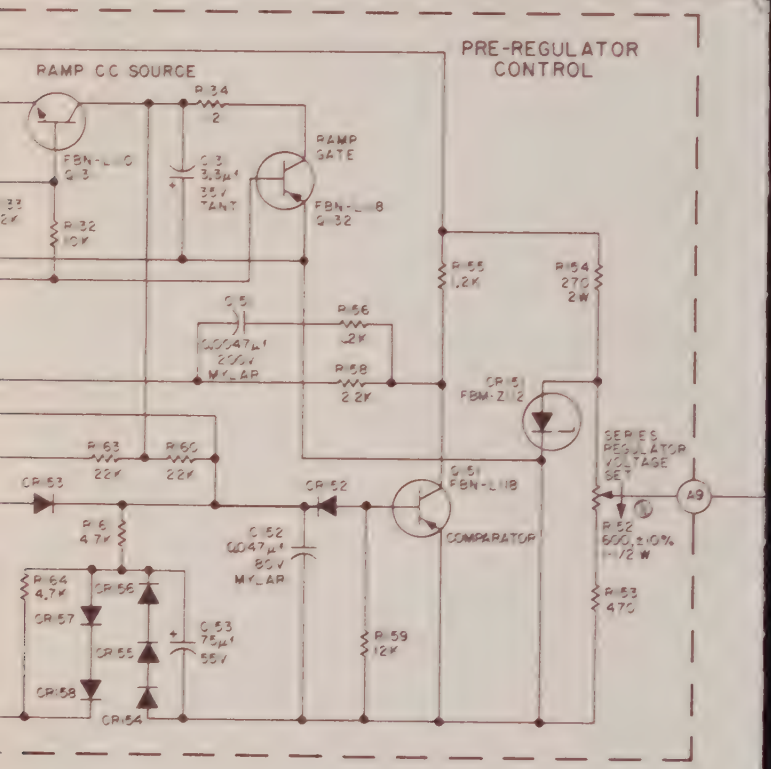
CAUTION
NOT AT CHASSIS GROUND POTENTIAL
DO NOT SHORT TO CHASSIS GROUND

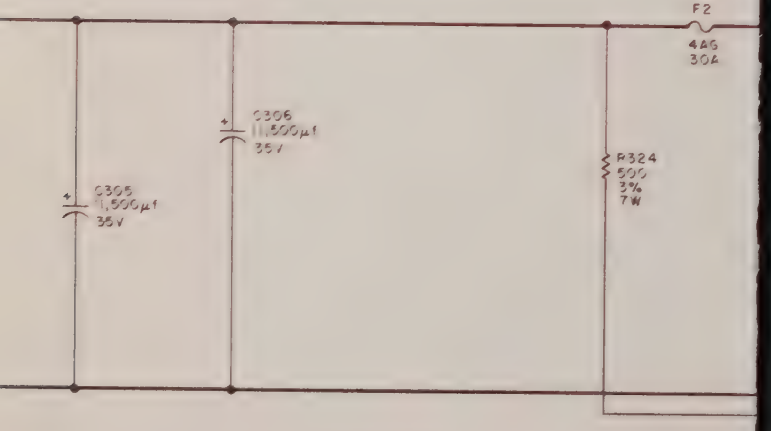


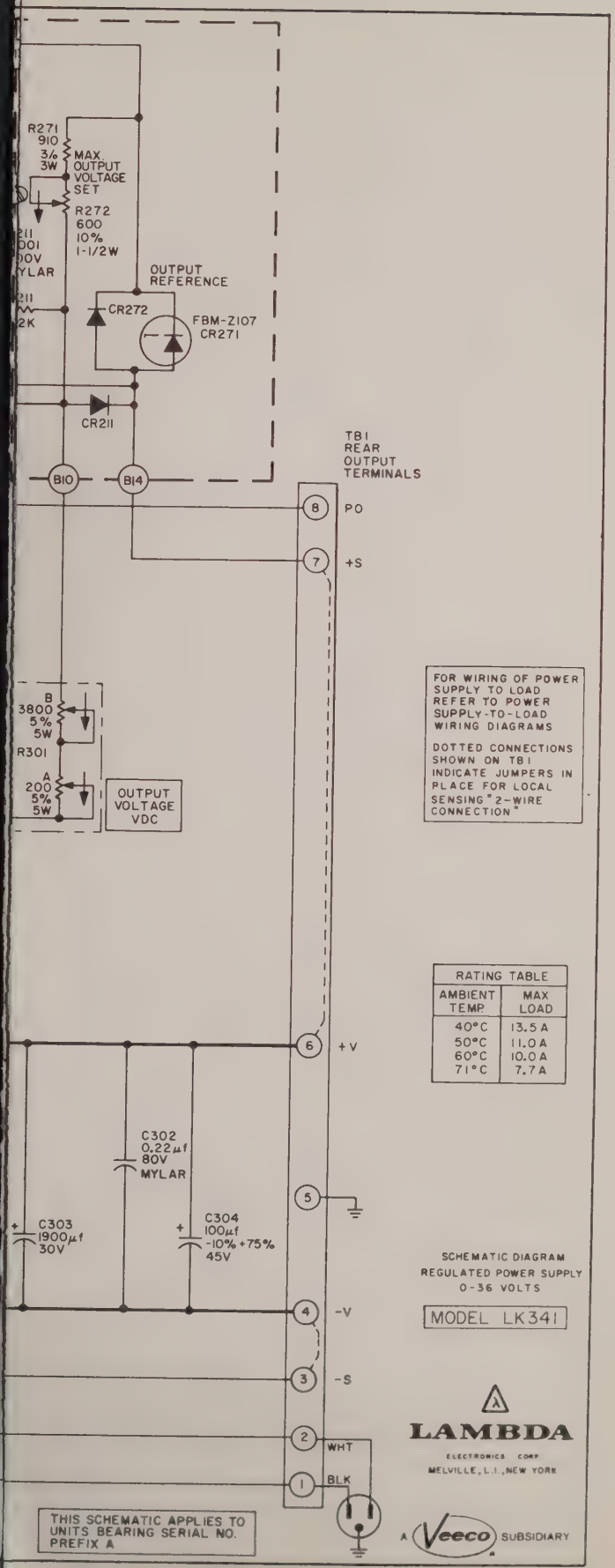
TRANSISTOR, PIN VIEW

DUAL COMPLEMENTARY TRANSISTOR, PIN VIEW
Q251, Q252
Q211, Q212




PRE-REGULATOR CONTROL
RAMP CC SOURCE
R 34
2
FBN-L C
Q 3
C 3
3.3µf
35 V
TANT
RAMP GATE
FBN-L B
Q 32
R 32
10K
R 55
1.2K
R 54
270
2W
C 5
.0047µf
200 V
MYLAR
R 56
2K
R 58
2.2K
CR 5
FBM-Z 12
R 63
22K
R 60
22K
CR 53
CR 52
Q 51
FBN-L11B
COMPARATOR
SERIES REGULATOR VOLTAGE SET
A9
R 52
600, ±10%
1-1/2 W
R 53
470
R 6
4.7K
C 52
.0047µf
80 V
MYLAR
R 64
4.7K
CR 56
CR 57
CR 55
CR 58
CR 54
C 53
75µf
55V
R 59
12K


F2
4AG
30A
C306
11,500µf
35V
C305
11,500µf
35V
R324
500
3%
7W

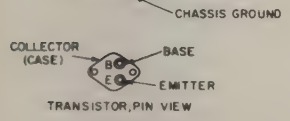

R271
910
3%
3W
MAX.
OUTPUT
VOLTAGE
SET
R272
600
10%
1-1/2W
OUTPUT
REFERENCE
CR272
FBM-Z107
CR271
CR211
TB1
REAR
OUTPUT
TERMINALS
B10
B14
8
PO
7
+S
B
3800
5%
5W
R301
A
200
5%
5W
OUTPUT
VOLTAGE
VDC
FOR WIRING OF POWER SUPPLY TO LOAD REFER TO POWER SUPPLY-TO-LOAD WIRING DIAGRAMS
DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING "2-WIRE CONNECTION"
RATING TABLE
AMBIENT TEMP
MAX LOAD
40°C 13.5 A
50°C 11.0 A
60°C 10.0 A
71°C 7.7 A
6
+V
C302
0.22μf
80V
MYLAR
C303
1900μf
30V
C304
100μf
-10% +75%
45V
5
4
-V
3
-S
2
WHT
1
BLK
SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY
0-36 VOLTS
MODEL LK341
LAMBDA
ELECTRONICS CORP
MELVILLE, L.I., NEW YORK
A Veeco SUBSIDIARY
THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIX A

SCB-343A

NOTES

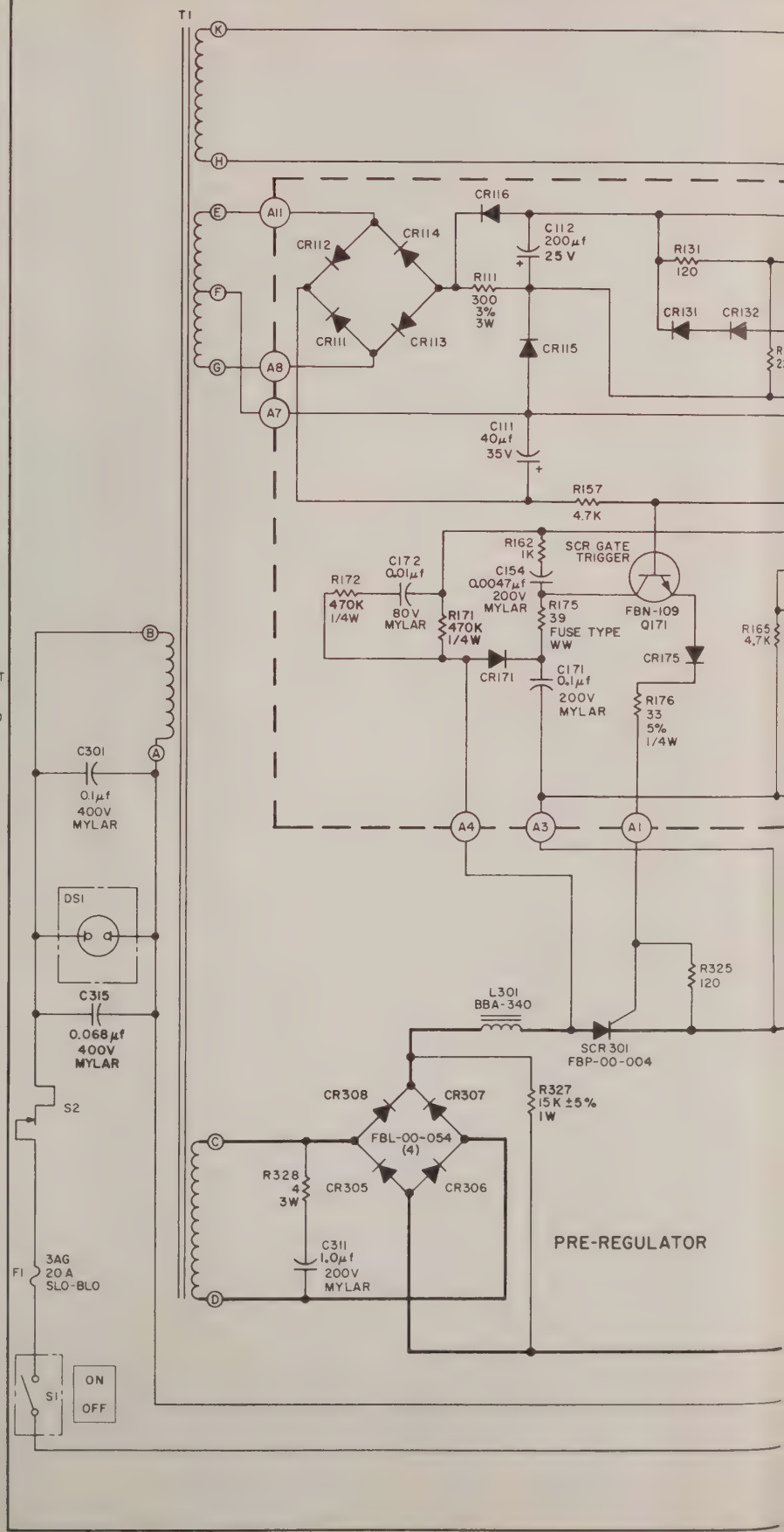
1. RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE NOTED.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED
3. RESISTOR TOLERANCES: COMPOSITION ±10%; WIREWOUND ±5% UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC, -10% +100%; TANTALUM, ±20%, PAPER, ±10%; CERAMIC, ±20%; MICA, ±20%, MYLAR, ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - INDICATES ACTUAL UNIT MARKING.
   - INDICATES FRONT-PANEL MOUNTED COMPONENT.
   - * INDICATES FACTORY ADJUSTMENT; SEE INSTRUCTION MANUAL.
   - O INDICATES TRANSFORMER LUG TERMINAL.
   - THIS DIODE IS LAMBDA PART NO. FBL-00-030; CAN BE REPLACED WITH STANDARD TYPE IN645 OR IN4002 DIODE UNLESS OTHERWISE NOTED.
6. CONDITIONS FOR CIRCUIT POINT VOLTAGE MEASUREMENTS.
   A. CONSTANT VOLTAGE
      READ ITALICIZED NUMBERS FOR CIRCUIT POINT VOLTAGES WHILE IN CONSTANT VOLTAGE OPERATION
      INPUT: 120 VAC, 60 HZ
      OUTPUT: MAX RATED VOLTAGE, OUTPUT CURRENT ZERO.
   B. CONSTANT CURRENT
      READ NUMBERS IN PARENTHESES FOR CIRCUIT POINT VOLTAGES WHILE IN CONSTANT CURRENT OPERATION
      INPUT: 120 VAC, 60 HZ, 30° AMBIENT
      OUTPUT: 0 VOLTS, OUTPUT CURRENT MAX. RATED CURRENT (SHORT CIRCUIT)
   INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED.
   DC MEASUREMENTS TAKEN WITH 20,000 OHMS/VOLT VOLTMETER BETWEEN -DC (TERM. 4) AND INDICATED POINTS UNLESS OTHERWISE NOTED.
7. DESIGNATIONS ARE LAMBDA PART NUMBERS.
8. ◯ INDICATES TERMINAL LOCATED ON TERMINAL BOARD "C", OR PRINTED WIRING BOARDS "A", "B".
9. COAT BOTH SIDES OF MICA WASHER OR ANODIZED ALUMINUM WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.

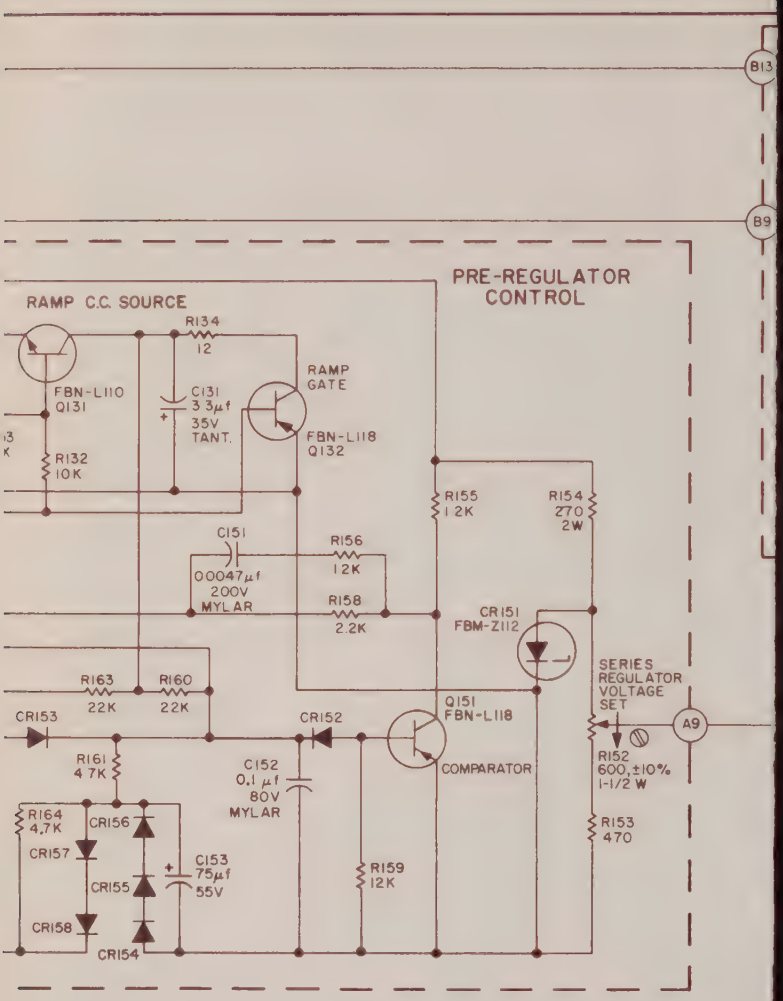
CAUTION
NOT AT CHASSIS GROUND POTENTIAL
DO NOT SHORT TO CHASSIS GROUND

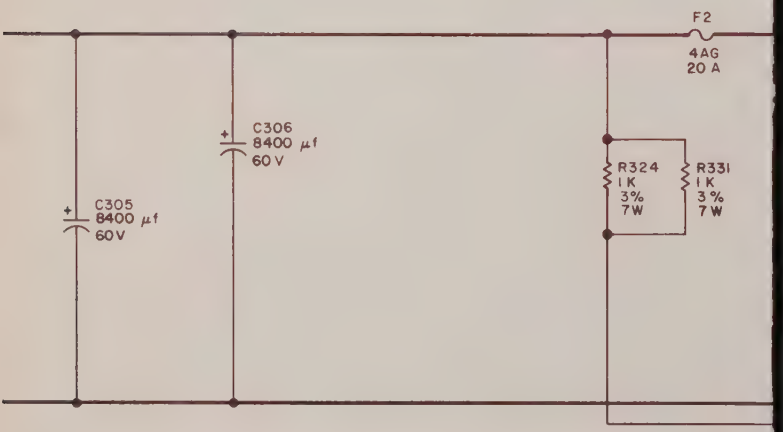


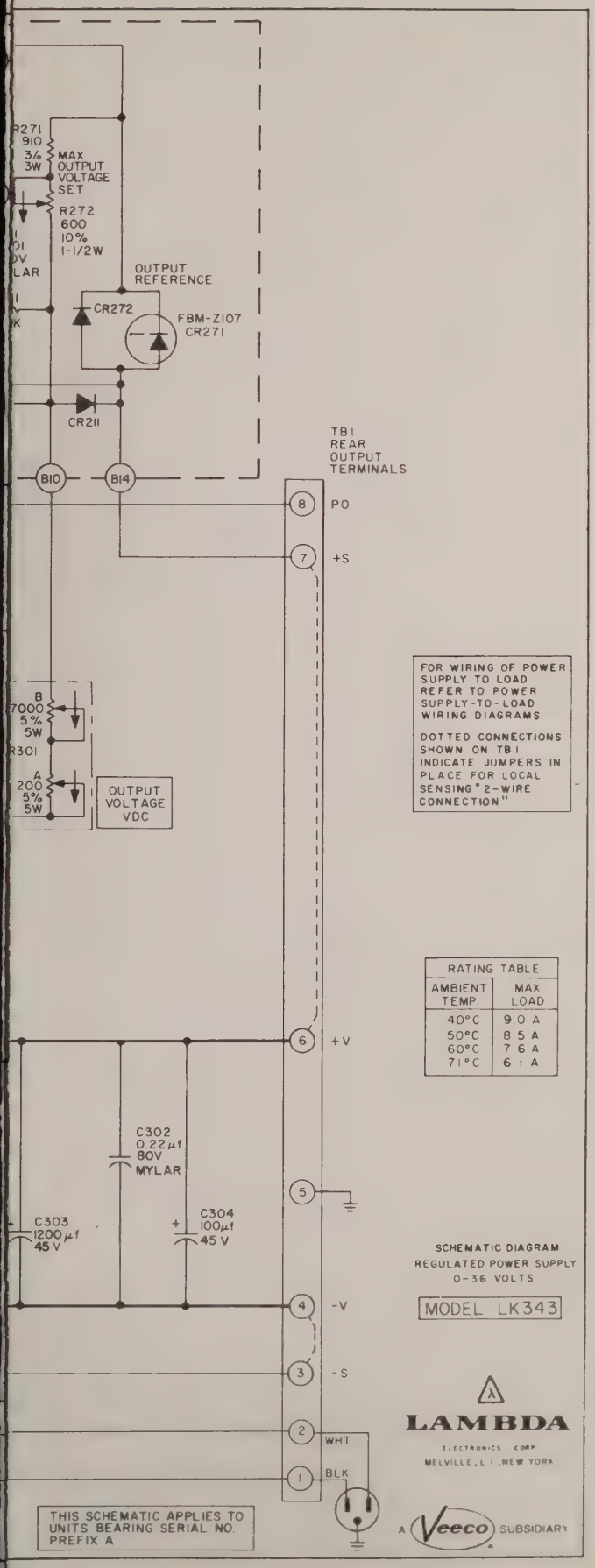
TRANSISTOR, PIN VIEW

DUAL COMPLEMENTARY TRANSISTOR, PIN VIEW
Q251, Q252
Q211, Q212




B13
B9
PRE-REGULATOR CONTROL
RAMP C.C. SOURCE
R134 12
FBN-L110 Q131
C131 3.3μf 35V TANT.
RAMP GATE
FBN-L118 Q132
R132 10K
R155 1.2K
R154 270 2W
C151 .00047μf 200V MYLAR
R156 1.2K
R158 2.2K
CR151 FBM-Z112
SERIES REGULATOR VOLTAGE SET
A9
R163 22K
R160 22K
CR153
CR152
Q151 FBN-L118
COMPARATOR
R161 4.7K
C152 0.1 μf 80V MYLAR
R152 600, ±10% 1-1/2 W
R153 470
R164 4.7K
CR156
CR157
CR155
CR158
CR154
C153 75μf 55V
R159 12K


F2
4AG 20 A
C306 8400 μf 60 V
C305 8400 μf 60V
R324 1K 3% 7W
R331 1K 3% 7W


R271
910
3%
3W
MAX
OUTPUT
VOLTAGE
SET
R272
600
10%
1-1/2W
OUTPUT
REFERENCE
CR272
FBM-Z107
CR271
CR211
TB1
REAR
OUTPUT
TERMINALS
B10
B14
8
P0
7
+S
B
7000
5%
5W
R301
A
200
5%
5W
OUTPUT
VOLTAGE
VDC
FOR WIRING OF POWER SUPPLY TO LOAD REFER TO POWER SUPPLY-TO-LOAD WIRING DIAGRAMS
DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING "2-WIRE CONNECTION"
RATING TABLE
AMBIENT TEMP
MAX LOAD
40°C 9.0 A
50°C 8.5 A
60°C 7.6 A
71°C 6.1 A
6
+V
C302
0.22μf
80V
MYLAR
5
C303
1200μf
45 V
C304
100μf
45 V
4
-V
3
-S
2
WHT
1
BLK
SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY
0-36 VOLTS
MODEL LK343
LAMBDA
ELECTRONICS CORP
MELVILLE, L.I., NEW YORK
A Veeco SUBSIDIARY
THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIX A

10 THE FOLLOWING COMPONENT DESIGNATIONS ARE NOT USED ON LK344. R316, R317B, [illegible] & Q305

NOTES

1 RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE NOTED

2 RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED

3 RESISTOR TOLERANCES COMPOSITION ±10%, WIREWOUND ±5% UNLESS OTHERWISE NOTED

4 CAPACITOR TOLERANCES: ELECTROLYTIC, -10% +100%, TANTALUM, ±20%, PAPER, ±10%, CERAMIC, ±20%, MICA, ±20%, MYLAR, ±10%; UNLESS OTHERWISE NOTED

5 SYMBOLS

- INDICATES CLOCKWISE ROTATION OF SHAFT
- INDICATES CONNECTION TO CHASSIS
- INDICATES ADJUSTMENT OR CALIBRATION CONTROL
- INDICATES ACTUAL UNIT MARKING.
- INDICATES FRONT-PANEL MOUNTED COMPONENT.
- * INDICATES FACTORY ADJUSTMENT, SEE INSTRUCTION MANUAL.
- ○ INDICATES TRANSFORMER LUG TERMINAL.
- THIS DIODE IS LAMBDA PART NO FBL-00-030; CAN BE REPLACED WITH STANDARD TYPE IN645 OR IN4002 DIODE UNLESS OTHERWISE NOTED.

6 CONDITIONS FOR CIRCUIT POINT VOLTAGE MEASUREMENTS

A CONSTANT VOLTAGE

READ ITALICIZED NUMBERS FOR CIRCUIT POINT VOLTAGES WHILE IN CONSTANT VOLTAGE OPERATION
INPUT 120 VAC, 60 HZ
OUTPUT MAX RATED VOLTAGE, OUTPUT CURRENT ZERO

B CONSTANT CURRENT

READ NUMBERS IN PARENTHESES FOR CIRCUIT POINT VOLTAGES WHILE IN CONSTANT CURRENT OPERATION
INPUT 120 VAC, 60 HZ, 30° AMBIENT
OUTPUT 0 VOLTS, OUTPUT CURRENT MAX RATED CURRENT (SHORT CIRCUIT)

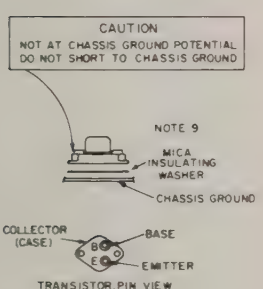
INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED

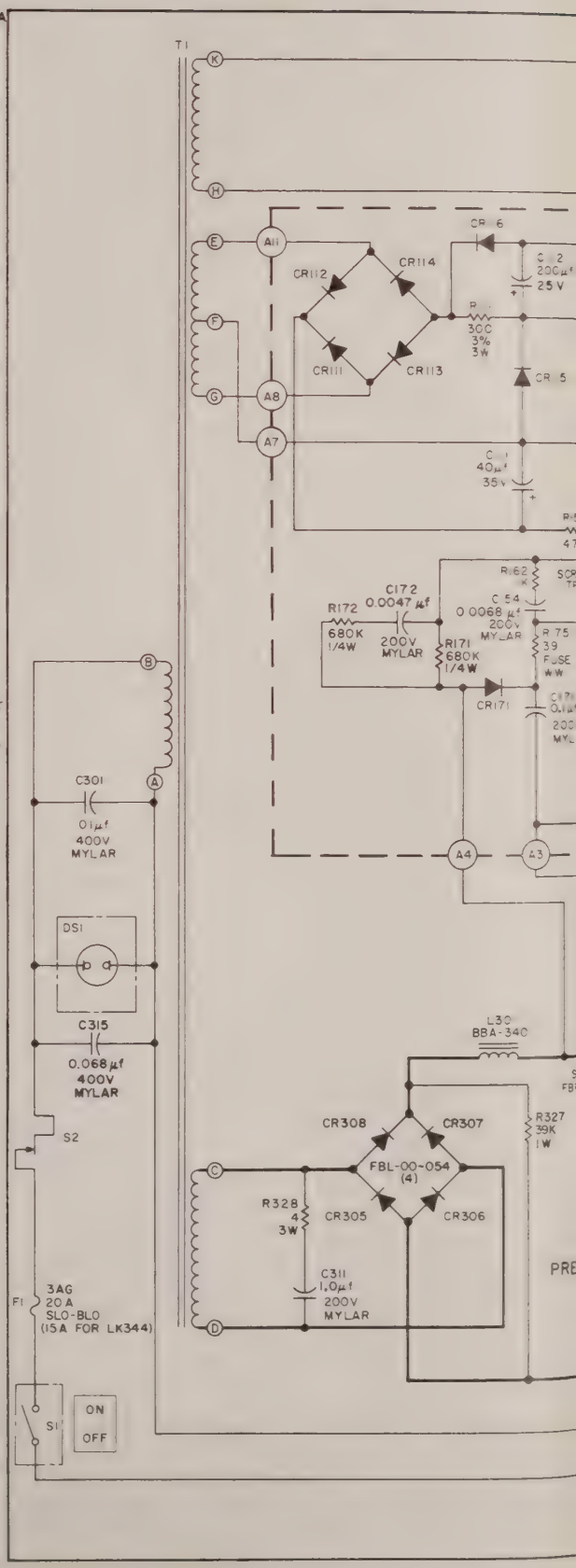
DC MEASUREMENTS TAKEN WITH 20,000 OHMS/VOLT VOLTMETER BETWEEN -DC (TERM 4) AND INDICATED POINTS UNLESS OTHERWISE NOTED.

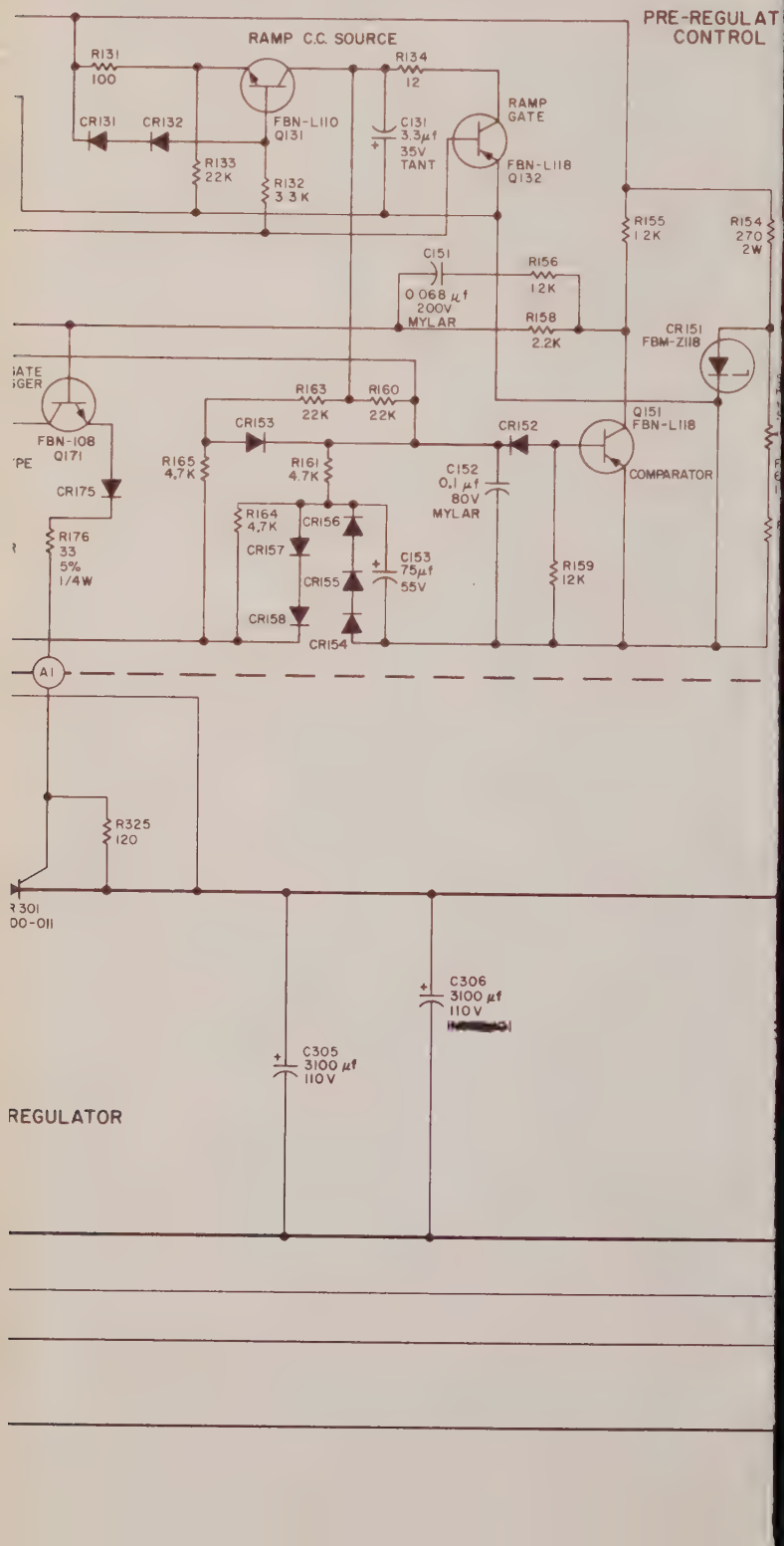
7 DESIGNATIONS ARE LAMBDA PART NUMBERS

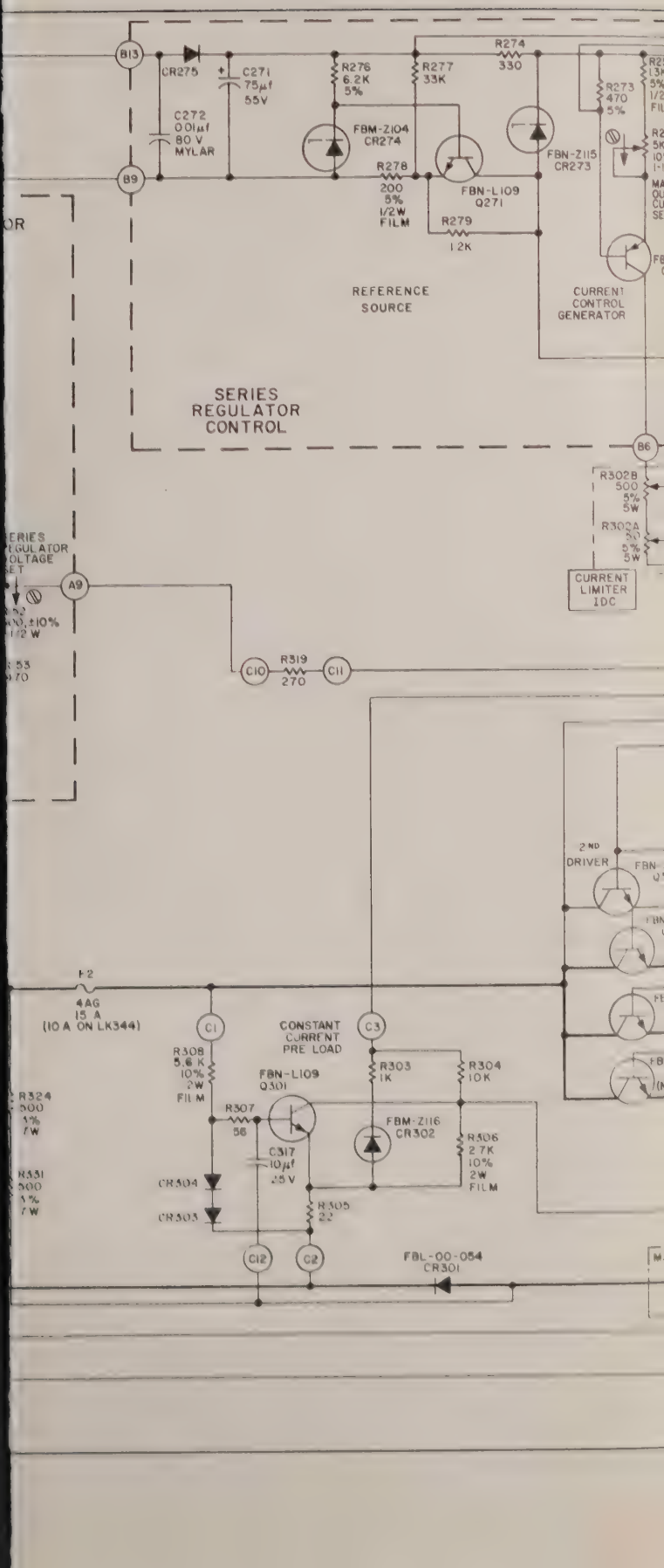
8 ◯ INDICATES TERMINAL LOCATED ON TERMINAL BOARD "C", OR PRINTED WIRING BOARDS "A", "B".

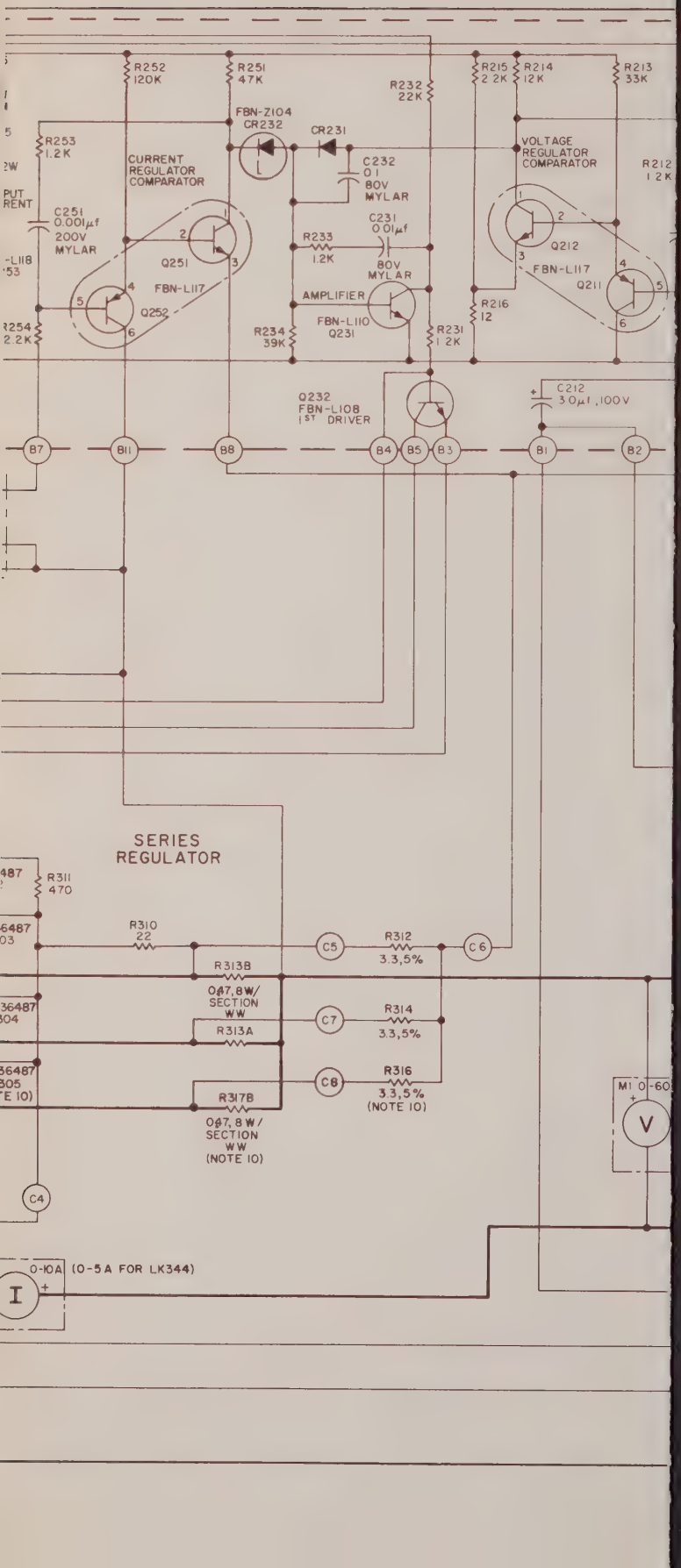
9 COAT BOTH SIDES OF MICA WASHER OR ANODIZED ALUMINUM WAFER WITH DOW CORNING NO 340 SILICONE GREASE

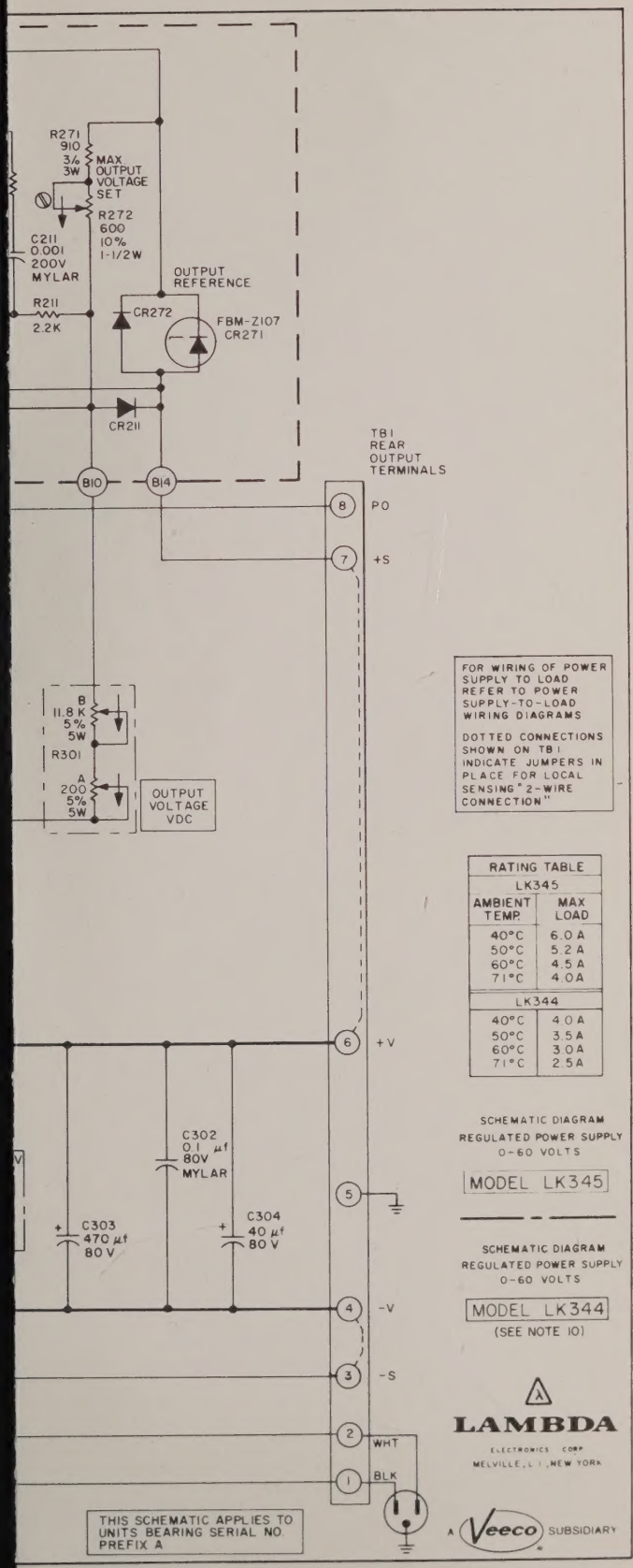


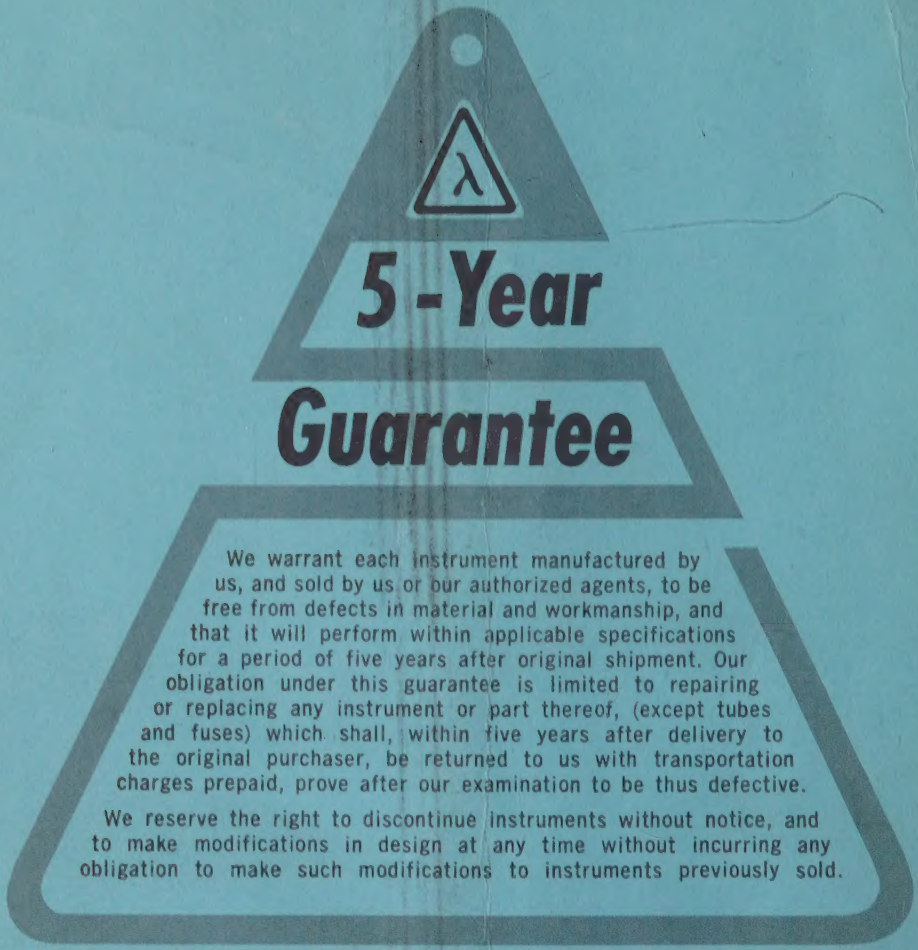



PRE-REGULAT
CONTROL
RAMP C.C. SOURCE
R131
100
R134
12
CR131
CR132
FBN-L110
Q131
C131
3.3µf
35V
TANT
RAMP
GATE
FBN-L118
Q132
R133
22K
R132
3.3K
R155
1.2K
R154
270
2W
C151
0.068 µf
200V
MYLAR
R156
1.2K
R158
2.2K
CR151
FBM-Z118
R163
22K
R160
22K
CR153
CR152
Q151
FBN-L118
COMPARATOR
FBN-108
Q171
R165
4.7K
R161
4.7K
C152
0.1 µf
80V
MYLAR
CR175
R164
4.7K
CR156
CR157
CR155
CR158
CR154
C153
75µf
55V
R159
1.2K
R176
33
5%
1/4W
A1
R325
120
C306
3100 µf
110V
C305
3100 µf
110V
REGULATOR


B13
CR275
C271
75μf
55V
C272
.001μf
80 V
MYLAR
B9
R276
6.2K
5%
R277
33K
R274
330
FBM-Z104
CR274
FBN-Z115
CR273
R278
200
5%
1/2W
FILM
FBN-L109
Q271
R279
1.2K
R273
470
5%
REFERENCE
SOURCE
CURRENT
CONTROL
GENERATOR
SERIES
REGULATOR
CONTROL
B6
R302B
500
5%
5W
R302A
5%
5W
CURRENT
LIMITER
IDC
A9
C10
R319
270
C11
2ND
DRIVER
F2
4AG
15 A
(10 A ON LK344)
C1
CONSTANT
CURRENT
PRE LOAD
C3
R308
5.6 K
10%
2W
FILM
FBN-L109
Q301
R303
1K
R304
10K
R307
56
C317
10μf
25 V
FBM-Z116
CR302
R306
2.7K
10%
2W
FILM
CR304
CR303
R305
22
C12
C2
FBL-00-054
CR301


R252 120K
R251 47K
R232 22K
R215 2.2K
R214 12K
R213 33K
FBN-Z104 CR232
CR231
R253 1.2K
CURRENT REGULATOR COMPARATOR
C232 .01 80V MYLAR
VOLTAGE REGULATOR COMPARATOR
R212 1.2K
C251 0.001µf 200V MYLAR
C231 0.01µf
R233 1.2K
80V MYLAR
Q212
FBN-L117
Q211
Q251
FBN-L117
Q252
AMPLIFIER
FBN-L110 Q231
R216 12
R234 39K
R231 1.2K
Q232 FBN-L108 1ST DRIVER
C212 30µf, 100V
B7
B11
B8
B4
B5
B3
B1
B2
SERIES REGULATOR
R311 470
R310 22
C5
R312 3.3,5%
C6
R313B
0ø7, 8W/ SECTION WW
C7
R314 3.3,5%
R313A
C8
R316 3.3,5% (NOTE 10)
R317B
0ø7, 8W/ SECTION WW (NOTE 10)
M1 0-60
V
C4
0-10A (0-5A FOR LK344)
I


R271
910
3/4
3W
MAX
OUTPUT
VOLTAGE
SET
R272
600
10%
1-1/2W
C211
0.001
200V
MYLAR
R211
2.2K
OUTPUT
REFERENCE
CR272
FBM-Z107
CR271
CR211
TB1
REAR
OUTPUT
TERMINALS
B10
B14
8
P0
7
+S
B
11.8K
5%
5W
R301
A
200
5%
5W
OUTPUT
VOLTAGE
VDC
6
+V
C302
0.1 µf
80V
MYLAR
C303
470 µf
80 V
C304
40 µf
80 V
5
4
-V
3
-S
2
WHT
1
BLK
FOR WIRING OF POWER SUPPLY TO LOAD REFER TO POWER SUPPLY-TO-LOAD WIRING DIAGRAMS
DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING "2-WIRE CONNECTION"
RATING TABLE
LK345
AMBIENT TEMP. | MAX LOAD
40°C 6.0A
50°C 5.2A
60°C 4.5A
71°C 4.0A
LK344
40°C 4.0A
50°C 3.5A
60°C 3.0A
71°C 2.5A
SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY
0-60 VOLTS
MODEL LK345
SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY
0-60 VOLTS
MODEL LK344
(SEE NOTE 10)
LAMBDA
ELECTRONICS CORP
MELVILLE, L.I., NEW YORK
A Veeco SUBSIDIARY
THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIX A


5 - Year
Guarantee
We warrant each instrument manufactured by us, and sold by us or our authorized agents, to be free from defects in material and workmanship, and that it will perform within applicable specifications for a period of five years after original shipment. Our obligation under this guarantee is limited to repairing or replacing any instrument or part thereof, (except tubes and fuses) which shall, within five years after delivery to the original purchaser, be returned to us with transportation charges prepaid, prove after our examination to be thus defective.
We reserve the right to discontinue instruments without notice, and to make modifications in design at any time without incurring any obligation to make such modifications to instruments previously sold.

LAMBDA ELECTRONICS CORP.
515 BROAD HOLLOW ROAD • MELVILLE, L. I., NEW YORK • 516 MYRTLE 4-4200